Distributional Performance of a Small-scale Lobster Fishery Managed Under a TURF Scheme

Desempeño Distribucional de una Pesquería de Langosta de Pequeña Escala Manejada bajo un Esquema de TURF

Performance Distributionnelle d'une Pêcherie de Homard à Petite Échelle Gérée dans le Cadre du Plan de Restructuration

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EXTENDED ABSTRACT

Introduction

Distributional performance has been described as an important topic to be considered in fishery management as it encompasses how the incomes, benefits and costs spreads between the different agents involved in an activity or management strategy (Clay et al. 2014). It has been stated as an important aspect to be analyzed in cases like marine protected areas (Sumaila and Armstrong 2006), consolidation of the quota/licenses (Clay et al. 2014, Bellanger et al. 2016), and as part of the social justice (World Bank 2013, Klain, et al. 2014). It has been identified as a factor capable of disturb the outcomes of management schemes (Guyader and Thébaud 2001, Sumaila 2010, Thébaud et al. 2012, Clay et al. 2014), and even can affect the fishery governance (Bundy et al. 2008, Allison et al. 2011).

Recently, the first distributional performance of a TURF scheme fishery was assessed. Villanueva et al. (2017) applied inequality metrics to the fishing benefits of the recognized highly successfully small-scale lobster fishery of Punta Allen, Mexico (Schlager and Ostrom 1992). In this evaluation, Gini index *G* was applied to the fishing benefits achieved by individual lobster fishing grounds holders. The results presented low Gini values (0.387 ± 0.017) and a stable trend in the seven lobster seasons analyzed. Although the G index of the resource rent among campo owners had the highest value, there were no statistically significant differences in the resource rent earned by age groups of campo owners, indicating a form of intergenerational equity. Nevertheless, although *G* index gives general information about the income distribution, more valuable knowledge can be inferred by knowing more precisely information about the gap between the higher and lower levels of the income distribution. Therefore, the aim of this work is to inquire more into the benefits gap in the Punta Allen lobster fishery.

Methodologies

The fishing benefits were evaluated through the calculation of the fishing revenues and the quasi-profits of the variable costs of the daily fishing trips for seven lobster fishing seasons (2007 - 2014). The calculations were performed using the fishing cooperative logbooks and following the methods and costs parameters followed by Villanueva et al. (2017). Then, the Hoover index was applied. The Hoover index *H* (also known as the Robin Hood index), measures the proportion of a variable that would need to be redistributed in order to achieve a completely equal distribution of that variable (Hoover 1941, Bellanguer et al. 2016). *H* index was calculated as:

$$H = \frac{1}{2}\frac{\sum_i^n |x_i - \bar{x}|}{\sum_i^n x_i}$$

Where x_i is the income (i.e. fishing revenues and quasi-profits of the variable costs) of the i^{th} person/element of the analyzed population (in this case individual fishing ground owners), and $\overline{X}$ the average income, *n* are the total proportions in which the analyzed population was divided (in this case deciles were used). As Gini index, Hoover index goes from 0 (perfect equity) to 1 (absolutely inequity).

Results, Discussion and Conclusions

The results are presented in Table 1. The *H* values present stability through the analyzed time period. Although the values are very close, the quasi-profits present slightly higher *H* values than those for the revenues. This can be due to the incorporation of the variable costs of the fishing trips. This incorporation could be proportionally affecting more to the

lowest revenues deciles, increasing the incomes gap and being reflected by the *H* index. This is the first time these values are calculated to this fishery. To put into context, the rights-based managed Bay of Biscay demersal fishery (ITQ system), presented a *H* index of 0.72 calculated on the landings (Bellanger et al. 2016). This is an indication of the high levels of equity among the holders of individual lobster fishing grounds in this fishery. The H low values could be reinforcing the high levels of efficiency that the lobster fishers of Punta Allen have reached, since they have succeeded in virtually achieving positives quasi-profits throughout all their fishing trips (Villanueva et al. 2017).

These results support previous works stating that there are no signs of increasing consolidations of the fishing benefits in the Punta Allen lobster fishery (Villanueva et al. 2017). The Punta Allen fishery success and its recognized resilience could be explained in part by the equity in the distribution of fishing benefits. The distributive aspect should be analyzed as a part of the fishery management schemes outcomes.

KEYWORDS: distributional performance, small-scale lobster fishery, inequality metrics, Hoover index

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Table 1. Hoover index values *H* of the fishing benefits achieved by the individual fishing grounds holders in the Punta Allen lobster fishery (México) in seven lobster seasons.

Lobster fishing seasons (July-February)	Fishing revenues	Quasi-profits of the variable cost
2007/2008	0.280	0.299
2008/2009	0.272	0.272
2009/2010	0.268	0.275
2010/2011	0.256	0.275
2011/2012	0.300	0.305
2012/2013	0.286	0.289
2013/2014	0.269	0.272
$\bar{x}(\pm s.d.)$	0.276 (±0.1)	0.284 (±0.1)