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Short communication

# Making history count: The shifting baselines of Turkish fisheries

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ABSTRACT

New evidence for 'shifting baselines' from different marine fisheries sectors in Turkey is presented, based on field interviews of local fishers with careers spanning up to 69 years. First, total fishing effort and catch per unit effort (CPUE) trends are presented for Turkey as a whole, and by sea. Then, using fisher survey data, the ratios of initial (i.e., early career) to current CPUE of individual fishers are presented along with their shifts in perceived change in resource abundance (PCRA), by sector. Total Turkish effort increased from 25 million kW days in 1967 to nearly 190 million kW days in 2010, while CPUE declined from about 16 kg/kW/day$^{-1}$ in 1967 to 4 kg/kW$^{-1}$/day$^{-1}$ in 2010. The artisanal, recreational and bottom trawl sectors of Turkey were shown to experience the most profound changes, representing approximately a 40 to 50-fold decline in CPUE since about 1950, while their PCRA also declined significantly. Shifting baselines was verified to have occurred for all sectors, except the purse seiners, which is attributed to overfishing triggering a trophic cascade in the underlying ecosystem.



## 1. Introduction

Turkey is situated on three major seas, the Black, Aegean and Mediterranean Seas, and one minor inland sea, the Sea of Marmara, with the Bosphorus and the Dardanelles providing the major links between these seas (Fig. 1). Istanbul (earlier Constantinople/Byzantium), for over 1500 years was the capital of empires, and remained healthy until 5–6 decades ago (Koray, 1962), when the transition to fossil fuels began to manifest itself in various economic sectors. Massive population growth led to an increase in seafood demand, met through more sophisticated technology aboard more powerful fishing vessels, whose deployment rendered many local species commercially extinct. The process took decades, however, and, as will be shown below, was not fully perceived by those who experienced it.

Here, we compare how the Turkish fisheries shifted both quantitatively (i.e., catch per unit effort, or CPUE) both spatially and sectorally, and qualitatively, in perception of resource abundance at the beginning of a fisher's career and at present, and thus evaluate the occurrence of shifting baselines.

The application of CPUE as an indicator of abundance has its weaknesses (Maunder et al., 2006; Walters, 2003), as hyperstability and spatial expansion may distort its proportionally to stock biomass (Daw, 2010). However, we feel confident that, given background knowledge of a given fishery, CPUE can be used as an indicator of long-term abundance. This is here due to the fact that, given the spatial expansion of Turkish fisheries and the technological innovations which increased nominal effort, using CPUE as an indice will actually overestimate recent abundances since spatial expansion and technological creep are unaccounted for, thus making our results conservative.

If recollections of earlier, more pristine ecological states are not transmitted from old to new fishers, long-term change can go unnoticed, a phenomenon called 'Shifting Baselines' SB; Pauly (1995). Under SB, a fisher accepts the state of an ecosystem as they found it, as the norm to which he/she will compare future changes to, therefore lacking historical perspective. As experienced fishers retire, their accumulated ecological knowledge is lost, and the baseline continuously shifts, leaving change to go overlooked. Note that the SB concept should not be perceived as only describing a sequential loss of biodiversity; rather, for SB to be validated, a gradual shift in the perception of the resources must accompany the decline of the resources themselves.

Learning about the past when data are scarce requires that we make optimal use of traditional knowledge (Dulvy et al., 2003; Papworth et al., 2009). Carefully structured questionnaires have proven successful in recalling such knowledge and determining how far from the baseline we may have moved from (O'Donnell et al., 2012; Thurstan et al., 2015).

Global reported fisheries catches have been declining since the late 1990s according to FAO (2012), but were witnessed decades earlier in many areas including the Black Sea, with the removal of large predators (FAO, 1994; Watson and Pauly, 2001). Here, to

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**Fig. 1.** Map of Turkey, with the cities where interviews were conducted.

evaluate if shifting baselines occurred in Turkey's marine fisheries, 176 fishers from four fishery sectors were interviewed to assess how each fisher's ratio of their initial to current CPUE (RICC) had varied. This ratio of change in CPUE was then compared to each fishers degree of perceived change in resource abundance (PCRA) over their careers. If newer fishers were unable to describe the change, but older fishers witnessed a change in both the RICC and PCRA, the existence of SB was considered validated. Following a brief synopsis of some past Turkish fisheries, national CPUE trends and total fishing effort are presented to illustrate some of the factors behind these declines.

### 1.1. Historical abundances from anecdotes

In the 1st century, Pliny described that the Golden Horn (an inlet in the Bosphorus; Fig. 1) was named so because it was teeming with so many fish that its surface appeared 'golden' (Tekin, 1996). Gilles (2000) described the Bosphorus as the best place in the world to fish in the 16th century, as people could fish by hand, or even from their windows by lowering a basket (Özdağ, 2013).

Four of the oldest fishers interviewed for this study born between 1937 and 1942 explained that the 'golden years' of fishing in Turkey lasted until the late 1950s, as anybody could catch as much swordfish (*Xiphias gladius*) and Atlantic mackerel (*Scomber scombrus*) as they could carry. Two fishers recalled that from Galata Bridge in the 1950s, (a popular recreational fishing spot to this day), anyone could cast a handline with 10 hooks, and within minutes, would be rewarded with many large fish such as bonito (*Sarda sarda*), two-banded seabream (*Diplodus vulgaris*), turbot (*Scophthalmus maximus*), bluefish (*Pomatomus saltatrix*) and large garfish (*Belone belone*). Swordfish migrations were so plenteous in the past that they were said to have hindered Ottoman maritime traffic