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The fishery resources of the southern East China Sea in the late 17^{th} century as retrieved from the ancient Chinese "*Catalog of Marine Creatures*"

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Global marine fishery resources have declined dramatically. Building sustainable fisheries benefits from knowledge on long-term changes in fishery resources at the centennial scale, which can only be investigated using historical data. Written in the 1690s, *Catalog of Marine Creatures* is a realistic illustration of common fishes then in the southern East China Sea (SECS), including notes such as individual size, economic value, fishing ground and season, migratory route, which can be used to retrieve the situation of fishery resources back then. There are 28 species of fishes that are of economic value in both the 1690s and modern times, some of which have evident size differences from today. The length of *Trichiurus haumela* was $\sim 4.6m$ in the 1690s and decreases to $\sim 0.84m$ nowadays, while that of *Engraulis japonicus* increases from $< 0.067m$ to $\sim 0.167m$. Five small-sized species including *Coilia sp.* appear in the Catalog with no economic value mentioned. The Catalog does not mention 11 small-sized species that are major economic fishes today, such as *Scomber japonicus*. It is evident that owing to overfishing sizes of high trophic level fishes feeding on swimming animals decrease, while those of zooplankton-consuming fishes increase. The shrinking of fisheries resources results in the exploitation of small fishes at low trophic levels.

The ancients caught economic fishes, including big yellow croakers (*Pseudosciaena crocea*), only in springs or summers when fishes were in spawning migrations. Modern fishing techniques advance fishing ground to deep waters and thus bring about fishing seasons in autumns and winters, and for some species the highest catch occurs in autumns. The onsets of spawning migrations for 5 species including *Scomberomorus niphonius* and *Engraulis japonicus* had a delay of 1-3 months in the 1690s, presumably due to winter sea-water temperature $> 1°$C lower than today in the Little Ice Age. In the 1690s, the fishing ground of *Trichiurus haumela* only appeared in winters and in waters offshore Taiwan and Fujian, while nowadays it appears in all seasons except summers and in both inshore and offshore waters of the SECS. A research shows that the present fishing ground of *Trichiurus haumela* is located near the fronts of Taiwan Warm Current, the Kuroshio and Zhejiang-Fujian Coastal Current. In the 1690s, the paths and the fluxes of the Taiwan Warm Current and the Kuroshio could differ from modern times due to the difference in winter sea-water temperature. In addition, the Yellow River then did not flow into the Bohai Sea, but into the Yellow Sea, which could increase the flux of Zhejiang-Fujian Coastal Current. These two conditions could lead to the changes of fronts of the three currents, which could in turn lead to a great difference in the fishing season and the fishing ground of *Trichiurus haumela* between the 1690s and the modern times.

Hence, a warming $> 1°$C in the future is very likely to affect fish migrations and fishery resources in the SECS, especially those of *Trichiurus haumela*. Reducing fish catches in autumns should significantly improve the regeneration of fishery resources.