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Editorial: Data-limited research in stock assessment to increase the understanding of fisheries resources and inform and improve management efforts

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Editorial on the Research Topic
Data-limited research in stock assessment to increase the understanding of fisheries resources and inform and improve management efforts

Management thinker Peter Drucker is often quoted as saying "You can't manage what you can't measure." Drucker means that you cannot know whether or not you are successful unless success is defined and monitored. Such a quote is fully applicable to fishery science because only when we can estimate the status of stocks can we provide meaningful and successful management advice: that which gets measured gets managed. However, an increasing share of fishers' income is derived from fish from stocks whose status remains unassessed. In such situations, a simple rough model might be more useful than no model at all.

The main reasons for the lack of assessment and associated formal harvest control rules are often associated to:

- lack of (quality) data to reliably inform a fully integrated stock assessment.
- limited capacity and funding.
- associated fishery characteristics, including inconsistent targeting practices, numerous unregulated operators, or profound cultural issues.
- the challenge of selecting from numerous possibilities and the most appropriate assessment and management options given the fishery's context.

However, many methods have been developed to assist in the assessment of the status of so-called data-limited stocks. Although not based on complex integrated models increasingly used in stock assessments, data-limited assessment methods, particularly when paired with precautionary harvest control rules, provide a reliable understanding of the stock status and might be used to achieve fishery sustainability.

A brief search on the Scopus database (www.scopus.com) highlighted approximately 360 documents produced between 1993 and 2023 pertaining to this area of research (TITLE-ABS-KEY [("data-limited" OR "data poor") AND "stock assessment")]. The bibliographic analysis showed an exponential increase with time, especially for "data-limited" approaches (Figure 1). These studies regarded mainly northern hemisphere countries (Figure 2).

The RT included 22 papers from various countries (two from the US, five from Med, and eight from China). The works of the RT are distributed mainly around several topics:

The first application of the data-limited approach to new species (e.g., Angelini et al., 2021; Falsone et al., 2021; Geraci et al., 2021; Shi et al., 2022; Tsikliras et al., 2021; Wang et al., 2021; Wang et al., 2022; Zhang et al., 2021; Zhang et al., 2022; Zhu et al., 2021).

The application of several data-limited approaches for comparison to the same species (e.g., Meissa et al., 2021; Simard et al., 2021; Zheng et al., 2022).

The development of the application of complex approaches adapted for data-limited situations (e.g., Harford et al., 2021;
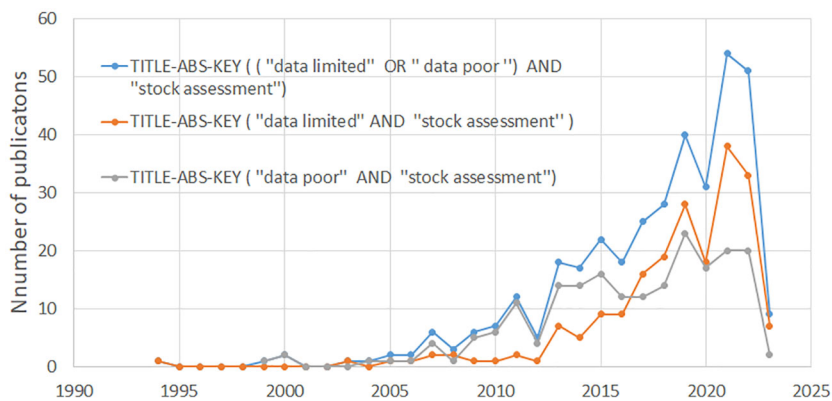

FIGURE 1
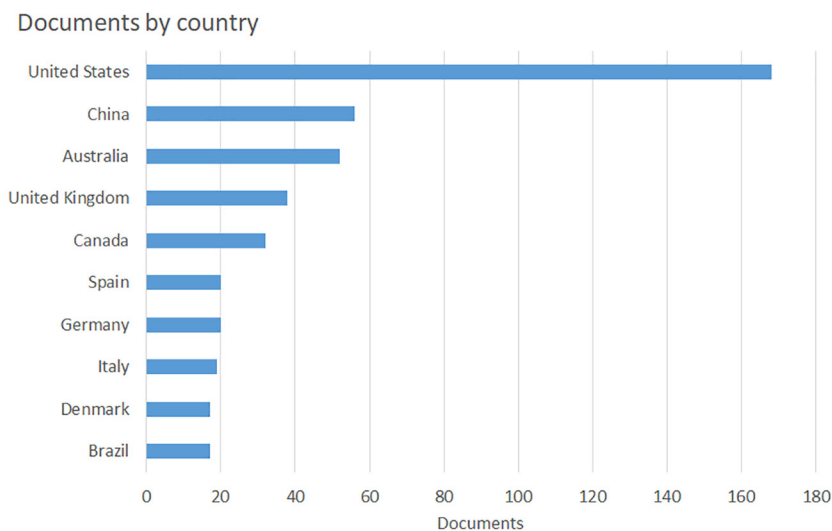Number of publications by year relevant to this research topic. Source: www.scopus.com.

FIGURE 2
Number of publications by country relevant to this research topic (only countries with more than 15 documents are presented). Source: www.scopus.com.

Mannini et al., 2020; Omori et al., 2021; Rudd et al., 2021; Sánchez-Maroño et al., 2021).

The assessment and forecasting approaches for data-limited species (e.g., Armelloni et al., 2021; Pantazi et al., 2020).

how data-limited stocks can undermine a formal management process (e.g., Kell et al., 2022).

The formal management harvest control rules for data-limited fisheries (e.g., Sanchez-Marono et al., 2021; Xia et al., 2021).

From the analysis of the keywords used in the 22 published manuscripts, the heterogeneity in covered topics is evident. However, the most used methodologies within the data-limited paradigm are production models (cited in 16 manuscripts) and length-based approaches (cited in six manuscripts).

Overall, this Research Topic provided a ground for discussing the potential of data-poor methods to be applied in fishery assessments as well as limitations on their use. Moreover, the studies covered a management perspective with a clear objective of resource conservation, sustainable exploitation, economic viability, and a combination of these and other aims. Although many of the data-poor studies in the present RT concentrate on the assessment of the status of biological resources, the overall conclusion is that the proper management of data-limited fisheries has specific research needs to be developed in the following years. These would focus on the application of artificial intelligence in stock assessment

methodologies and the implementation of data collection programs dedicated to the understanding of specific parameters (e.g., carrying capacity). Such needs have also to take into account the state of the art depicted in the 22 scientific studies collected under this RT.

Author contributions

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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