LETTERS

Shortfin mako shark (*Isurus oxyrinchus*)

Edited by **Jennifer Sills**

Shortfin mako sharks threatened by inaction

Oceanic shark populations are declining as a result of high fishing pressure and lack of international catch quotas (*1*, *2*). There has been management inaction for decades partly because species data is poorly recorded (*1*–*4*). However, despite improvements in data quality and models underpinning more accurate scientific stock assessments (*5*), regulators are not abiding by scientists' advice, as exemplified by the lack of action after the recommendations made at the November 2017 meeting of the International Commission for the Conservation of Atlantic Tunas (ICCAT).

The tunalike shortfin mako shark *Isurus oxyrinchus* is one of the fastest sharks, clocking speeds of up to 70 km/h (*6*). Yet, it is the second-most common oceanic shark caught by high-seas longline and net fisheries, principally for high-value fins (*2*–*4*). Although grossly underestimated (*2*), North Atlantic reported catches currently exceed 3300 tons annually—about 130,000 individuals (*5*). The 2017 ICCAT stock assessment confirmed that the North Atlantic is overfished (*5*) and recommended reducing the annual mako shark catch to 500 tons or less to prevent further declines (*7*).

ICCAT member nations did not agree to a quota to limit North Atlantic mako catches. Instead, ICCAT recommended (but did not require) a compromise in which sharks brought alongside vessels alive should be released (*8*). Research [e.g., (*2*, *3*, *9*)] indicates that 60 to 80% of longline-hooked makos reach vessels alive. Accordingly, considering longline-only catches for 2016 [3146 tons (*7*)], let us assume that vessels adhere to recommendations and promptly release all live sharks (optimistically, 80% of 3146 tons caught, or 2517 tons released). About 30% (755 tons) are likely to die after release (*9*). The retained catch (20% of 3146 tons, or 629 tons) added to the sharks that die post-release still total about 1400 tons annually, nearly three times the upper limit of scientific advice.

Action taken so far by ICCAT will not halt the decline. Even if total catches decrease to 500 tons, probability of stock rebuilding by 2040 is only 35%, rising to 54% for zero catch (*5*). Thus, recovery will be very slow even if prohibition can be agreed upon and, importantly, is enforced.

David W. Sims,[1,2]* Gonzalo Mucientes,[3] Nuno Queiroz[3]

[1]Marine Biological Association of the UK, Plymouth PL1 2PB, UK. [2]University of Southampton, Southampton SO14 3ZH, UK. [3]CIBIO/InBIO–Universidade do Porto, 4485-668 Vairão, Portugal.
*Corresponding author. Email: dws@mba.ac.uk

REFERENCES

1. B. Worm *et al.*, *Mar. Pol.* **40**, 194 (2013).
2. S. E. Campana, *Can. J. Fish. Aquat. Sci.* **73**, 1599 (2016).
3. N. Queiroz *et al.*, *Proc. Natl. Acad. Sci. U.S.A.* **113**, 1582 (2016).
4. M. D. Camhi, E. K. Pikitch, E. A. Babcock, Eds., *Sharks of the Open Ocean: Biology, Fisheries and Conservation* (Blackwell, Oxford, 2008).
5. International Commission for the Conservation of Atlantic Tunas, "Report of the 2017 ICCAT Shortfin Mako Assessment Meeting" (Madrid, Spain, 2017); www.iccat.int/Documents/Meetings/Docs/2017_SMA_ASS_REP_ENG.pdf.
6. G. Diez, M. Soto, J. M. Blanco, *J. Fish Biol.* **87**, 123 (2015).
7. International Commission for the Conservation of Atlantic Tunas, "Report of the Standing Committee on Research and Statistics (SCRS)" (Doc. No. PLE 104/2017, Madrid, Spain, 2017); www.iccat.int/Documents/Meetings/Docs/2017_SCRS_REP_ENG.pdf.
8. International Commission for the Conservation of Atlantic Tunas, "Draft Recommendation by ICCAT on the Conservation of North Atlantic Stock of Shortfin Mako Caught in Association with ICCAT Fisheries" (Doc. No. PA4-812B/2017, 2017); www.iccat.int/com2017/DocENG/PA4_812B_ENG.pdf.
9. S. E. Campana, W. Joyce, M. Fowler, M. Showell, *ICES J. Mar. Sci.* **73**, 520 (2016).

10.1126/science.aat0315

Mitigate risk for Malaysia's mangroves

Malaysia is the third largest mangrove-holding nation, with 4691 km² of mangroves (*1*), despite the reported losses including 278 km² between 2000 and 2014 (*1*). Mangrove habitat loss in Malaysia is mainly attributed to land conversion for agriculture, aquaculture, and urban development (*2*). Malaysia's mangroves are also affected by severe erosion, aggravated by anthropogenic disturbances along with the rising sea level (*3*). The combined effect from these disturbances jeopardizes the role of mangroves as a functional habitat that provides vital ecosystem services and connectivity and secures the livelihoods of Malaysia's coastal communities (*4*). The remaining mangroves are now fragmented and are susceptible to further disturbances, putting the ecosystems at a greater risk of collapsing (*5*).

To mitigate the risk, a comprehensive governance framework for resource management and habitat conservation should control anthropogenic influences (*6*). An intertidal habitat, mangroves lie between terrestrial and marine ecosystems. Land and natural resources are protected by a variety of state by-laws and inconsistent implementation and enforcement of national policies by the states (*7*). Meanwhile, the primary law pertaining to Malaysia's marine biotic resources—Fisheries Act 1985—focuses largely on the management of fisheries, aquaculture, and marine parks and provides no protection for intertidal habitats (*8*). As a result, mangroves fall into administrative loopholes; they are partially conserved and governed through various federal laws and policies, which are being enforced at the state level by multiple agencies with differing interests and priorities (*9*). With such piecemeal protection efforts, mangroves continue to be indirectly disturbed or directly exploited regardless of whether they are deemed a legally protected site.

To ensure the sustainability of Malaysia's mangroves, state authorities—with scientists' input (*10*)—must streamline their priorities. Flaws in the planning, approval, and project implementation processes must be minimized. Environmental impact assessments must be improved to prevent setbacks such as insufficient data and inadequate baseline studies, poor reporting by incompetent personnel, and the lack of public participation in the review process (*11*). Existing laws must be strictly enforced. Given the increasing threats from global climate

PHOTO: WILDESTANIMAL/SHUTTERSTOCK.COM

change, and considering mangroves' outstanding ability to efficiently fix and store atmospheric carbon (*12*), Malaysia must waste no time in making plans to fully conserve all remaining mangroves.

A. Aldrie Amir
Institute for Environment and Development (LESTARI), Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia.
Email: aldrie@ukm.edu.my

REFERENCES

1. S. Hamilton, D. Casey, *Glob. Ecol. Biogeogr*. **25**, 729 (2016).
2. D. Richards, D. Friess, *Proc. Natl. Acad. Sci. U.S.A*. **113**, 344 (2016).
3. N. A. Awang, W. H. Jusoh, M. R. A. Hamid, *J. Coastal Res.* **71**, 122 (2014).
4. V. C. Chong, *Aquat. Ecosyst. Health* **9**, 249 (2006).
5. N. Duke *et al.*, *Science* **317**, 41 (2007).
6. M. M. Foley *et al.*, *Mar. Pol.* **34**, 955 (2010).
7. W. Talaat, N. M. Tahir, M. L. Husain, *J. Polit. Law* **5**, 180 (2012).
8. Government of Malaysia, *Laws of Malaysia: Fisheries Act 1985 (Act 317)*, Second reprint (2006); www.agc.gov.my/agcportal/uploads/files/Publications/LOM/EN/Act%20317%20-%20Fisheries%20Act%201985.pdf.
9. D. Friess *et al.*, *Conserv. Biol.* **30**, 933 (2016).
10. D. A. Friess, E. L. Webb, *Environ. Conserv.* **38**, 1 (2011).
11. O. A. Lee, *Ocean Coast. Manage.* **53**, 439 (2010).
12. D. C. Donato *et al.*, *Nat. Geosci.* **4**, 293 (2011).

10.1126/science.aas9139

India's Ph.D. scholar outreach requirement

As demand increases for scientists and researchers to take part in public engagement and outreach (*1*–*3*), the Government of India's Department of Science and Technology plans to require Ph.D. scholars to write a popular science article on their research before completing their degree (*4*). The Department's National Council of Science and Technology Communication has launched a related program that will select the best entries from such articles by Ph.D. scholars and postdoctoral fellows each year. Winners will receive a monetary reward and a certificate of appreciation, and their work will be published in a mass media outlet (*5*). These ideas are part of the government's larger plan to push science and technology organizations to embrace "scientific social responsibility" and to encourage scientists to popularize science among the public (*4*, *6*, *7*). Dialogue with nonspecialist audiences builds support for science and makes clear its relevance in society (*8*). If implemented properly, the proposed degree requirement can boost science communication while serving as a global trendsetter in the field.

However, this policy will not be effective unless appropriate provisions are made to train the scholars in science communication and equip them with writing skills. Integrating science communication training into science curricula is imperative to nurture a future generation of scientists who can explain their research to the public (*8*, *9*). During such training, Ph.D. scholars should be taught to communicate their research with not only peers, but the public, the media, and other stakeholders. In addition to teaching scholars to write research papers, reports, and grant proposals, courses should cover how to translate research into accessible language appropriate for popular science articles and press releases, how to engage with nonscientist audiences, how to dejargonize public speaking scripts, how to give media interviews and handle media queries, and how to document (film) their research for public consumption. Activities such as learning by doing, role playing, and real-life engagements can further hone writing and communication skills. Efforts should also be made to inculcate a sense of responsibility and passion for communicating research to society among Ph.D. scholars. Without such comprehensive communication support, the government's plan to improve scientific outreach would become just another numeric parameter.

Abhay S. D. Rajput
Indian Institute of Tropical Meteorology, Pune, India and Department of Humanities and Social Sciences, BITS Pilani, Pilani, India. Email: abhaysdr@gmail.com

REFERENCES

1. "Survey of factors affecting science communication by scientists and engineers" (The Royal Society, UK, 2006).
2. A. Dudo, J. C. Besley, *PLOS One* **11**, e0148867 (2016).
3. H.P. Peters, *Proc. Natl. Acad. Sci.* **110** (suppl. 3), 14102 (2013).
4. J. Koshy, "Aspirant scientists may first need to tell a story," *The Hindu* (2017); www.thehindu.com/news/national/aspirant-scientists-may-first-need-to-tell-a-story/article19835061.ece.
5. Government of India, Ministry of Science and Technology, Department of Science and Technology (2018); http://dst.gov.in/republic-day-2018.
6. Press Information Bureau, Government of India, Ministry of Science and Technology (2017); http://pib.nic.in/newsite/PrintRelease.aspx?relid=169646.
7. Press Information Bureau (2017); http://pib.nic.in/newsite/PrintRelease.aspx?relid=167194.
8. A. S. D. Rajput, *Curr. Sci*. **113**, 2262 (2017).
9. S. E. Brownell, J. V. Price, L. Steinman, *J. Undergrad. Neurosci. Educ.* **12**, E6 (2013).

10.1126/science.aat0303

Editor's Note

Last week's Working Life (http://scim.ag/instainequality) drew heated criticism. We will run a selection of reader responses in an upcoming issue.
Tim Appenzeller, News Editor

Science

Editor's Note

Tim Appenzeller

Science **359** (6382), 1343.
DOI: 10.1126/science.359.6382.1343-b

Science (print ISSN 0036-8075; online ISSN 1095-9203) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. The title *Science* is a registered trademark of AAAS.