

EDITORIAL

Oceans and human health

Submitted 25 October 2015; accepted 29 October 2015

This special issue of the JMBA marks a significant departure from the normal content we are familiar with in the Journal. Following a period of intense and often rather focused research, Marine Biology, indeed the whole of the Marine Sciences community is undergoing a ‘sea change’ (sic!!) in its outlook and approach. We are now embracing ideas and establishing closer collaborative links with the Social Sciences (including economics and the law), and the biomedical and public health communities.

Much of this is driven by the need for us all to think more about the impact and relevance of our work to the wider public, together with the sustainability of the marine ecosystem and ecosystem services whose form and function we explore.

The collection of papers in this issue arises from a Workshop on Oceans and Human Health held in 2014 (<http://www.ecehh.org/events/oceans-human-health/>). The range of topics covered is impressive, from the more traditional papers on harmful marine algae to reviews of how the law impacts the use of our coastal areas, economic perspectives of oceans and human health and the ‘Blue Gym’. All the papers share in their highly interdisciplinary approach, and their focus on the health of both humans and the marine environment.

This diversity of titles reflects the complexity of interactions between the seas and oceans, and human health and wellbeing. It is of interest here to consider that until recently in the social sciences and the medical and public health communities, attention has primarily focused on the negative impacts of the oceans and seas on human health (e.g. drowning and injury from extreme weather events or from fishing disasters), while in the marine biology/marine science community attention has traditionally been directed to the many benefits (e.g. healthy foods, novel drugs etc.) as well as the potentially negative environmental impacts (e.g. red tides, exotic species etc.). Now, there is increasing recognition that the ‘health’ of our seas and oceans is inextricably linked to human health and wellbeing in a number of other, often quite complex ways.

This has led to the realization that marine biologists/scientists, social scientists, as well as public health and medical scientists must come together if we are to address the impacts of human activities on the marine environment, and how this affects the stability and sustainability of human populations and their activities. These interactive effects can be seen at both the local scale (e.g. microbial

pollution on specific beaches) and the global scale (e.g. ocean acidification associated with higher atmospheric CO₂). It has become apparent that many of these anthropogenic ocean impacts will inevitably affect human health and activities now and into the future (Knap *et al.* 2002; Bowen *et al.*, 2006; Fleming *et al.*, 2006; Fleming and Laws, 2006; Walsh *et al.*, 2008; Bowen *et al.*, 2014; Fleming *et al.*, 2014).

There is then a growing realization that all the interactions between humans and the oceans can have both benefits and risks. Destruction of these ecosystems, through pollution and unsustainable development for example, threatens important potential health-related discoveries. Additional, possibly more complex interactions, are being recognized by the wider population; for example, while algae and other phytoplankton form the basis of the entire marine food chain, some species produce potent natural toxins harmful to humans and other animals, and these same species may be increasing due to human activities. At the same time, we are increasingly relying on the oceans and seas for a range of important resources and human activities, from fishing and transport to future deep sea mineral mining and energy exploration (e.g. European Union Blue Growth Strategy: http://ec.europa.eu/maritimeaffairs/policy/blue_growth/). And all these human interactions impact on the health of local and (in the case of climate change) global marine ecosystems, and through ecosystem degradation, on human health and wellbeing.

While most of these kinds of interactions are quantifiable in one way or another, those surrounding human health and wellbeing need to be explored using qualitative research methods to truly understand the scope of their short- and long-term impacts. For example, the exploration of the potential positive benefits from interacting with the coasts and ‘blue environment’ need both qualitative and quantitative methodologies. Since the 18th century, ‘taking the waters’ either as medicine or immersion was promoted as being beneficial to health; this contributed to the growth of the medical ‘thalassotherapy’ approach and industry. In the 21st century, we are now seeing the emergence of terms such as the ‘Blue gym’, coined to describe the sometimes indefinable, or at least difficult to quantify, mental and physical health benefits to be obtained from experiencing proximity to marine environments.

Our aim in this special issue of JMBA is then to expose marine scientists to the extensive literature surrounding ‘Health Promotion and Prevention’ and other cognate areas

of Public Health. If we are to address this, a new, integrated and truly interdisciplinary approach is needed, that embraces not only among scientists and across scientific communities, but also policymakers and other stakeholders including the general public (Laws *et al.*, 2008; Walsh *et al.*, 2008; European Marine Board, 2014). This new meta-discipline, Oceans and Human Health, necessarily also incorporates perspectives from medicine, psychology, public health, geography, oceanography, economics and sociology, as well as the law, humanities, business and the arts.

Supporting this vision, an increasing number of unanticipated groups are realizing they too are stakeholders in oceans and human health. For example, in addition to the millions of inhabitants of rapidly growing coastal cities, there are increasing numbers of people moving to or visiting coastal locations around the globe with a resulting growing number of businesses that serve them (e.g. tourism, aquaculture and fisheries, pharmaceuticals, transport, energy sectors), non-governmental organizations (NGOs) (e.g. Ocean Conservancy (<http://www.oceanconservancy.org/>), World Wildlife Fund (<http://www.worldwildlife.org/>), Surfrider Foundation (<http://www.surfrider.org/>), Pew Foundation (<http://www.pewtrusts.org/en>) and other similar organizations).

In this special issue, we present a range of papers which we hope provide an accessible overview of this exciting new field. Those included are representative of the diverse nature of those with an interest and concern for the marine environment. We hope that this will serve to highlight the necessary interdisciplinarity required for collaborative partnerships across wider scientific communities that will be vital if we are to work effectively towards the preservation and protection of our coasts and oceans.

REFERENCES

- Bowen R.E., Halvarson H. and Depledge M.H.** (2006) The oceans and human health. *Marine Pollution Bulletin* 53, 631–639.
- Bowen R., Depledge M., Carlarne C. and Fleming L.E.** (eds) (2014) *Seas, society and human wellbeing*. Chichester: Wiley.
- European Marine Board** (2013) Linking Oceans and Human Health: A Strategic Research Priority for Europe. Position paper 19 of the European Marine Board, Ostend, Belgium. <http://www.marineboard.eu/file/16/download?token=ajbOdCao>
- Fleming L.E., Broad K., Clement A., Dewailly E., Elmir S., Knap A., Pomponi S.A., Smith S., Solo Gabriele H. and Walsh P.** (2006) Oceans and human health: emerging public health risks in the marine environment. *Marine Pollution Bulletin* 53, 545–560.
- Fleming L.E. and Laws E.** (2006) The overview of oceans and human health. *Oceanography* 19, 18–23.
- Fleming L.E., McDonough N., Austen M., Mee L., Moore M., Depledge M.H., White M., Philippart K., Bradbrook P. and Smalley A.** (2014) Oceans and human health: a rising tide of challenges and opportunities for Europe. *Marine Environment Research* 99, 16–19.
- Knap A., Dewailly E., Furgal C., Galvin J., Baden D., Bowen R.E., Depledge M., Duguay L., Fleming L.E., Ford T., Moser F., Owen R., Suk W.A. and Unluata U.** (2002) Indicators of ocean health and human health: developing a research and monitoring framework. *Environmental Health Perspectives* 110, 839–845.
- Laws E., Fleming L.E. and Stegeman J.** (2008) Overview of NSF NIEHS and NOAA oceans and human health centers. Mini-monograph: research in oceans and human health. *Environmental Health* 7, S1: 1–5.
- Walsh P.J., Smith S., Fleming L., Solo-Gabriele H. and Gerwick W.H.** (eds) (2008) *Oceans and human health: risks and remedies from the seas*. Waltham, Massachusetts: Elsevier.

Correspondence should be addressed to:

M. Thorndyke
Department of Biological and Environmental Sciences, Royal Swedish Academy of Sciences, Distinguished Chair of Experimental Marine Biology, Sven Lovén Centre for Marine Sciences, University of Gothenburg, Kristineberg, Fiskebäckskil 451 78, Sweden
email: mike.thorndyke@bioenv.gu.se

Fiona McGowan¹, Michael Thorndyke²,
Helena Solo-Gabriele³ and Lora E. Fleming⁴
¹Academie voor Gezondheids studies, Eyseniusplein 18, 9714 CE Groningen, Netherlands, ²Department of Biological and Environmental Sciences, Royal Swedish Academy of Sciences, Distinguished Chair of Experimental Marine Biology, Sven Lovén Centre for Marine Sciences, University of Gothenburg, Kristineberg, Fiskebäckskil 451 78, Sweden, ³Department of Civil, Arch., and Environmental Engineering, University of Miami, College of Engineering, P.O. Box 33124–0620, Coral Gables, FL 33146-0620, USA, ⁴European Centre for Environment and Human Health, University of Exeter Medical School, Knowledge Spa, Royal Cornwall Hospital, Truro TR1 3HD, UK

DEDICATION

We would like to dedicate this special issue to two key researchers and leaders in the world of Oceans and Human Health, the late Professor Eric DeWailly (Laval University) and Professor Laurence Mee (Scottish Association of Marine

Sciences). Their interdisciplinary research approach, enthusiasm, creativity, inclusiveness and international horizon scanning perspective have impacted all whose lives they touched and contributed directly to Oceans and Human Health.