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Editorial

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Editorial

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The investigation and reporting of impacts of tributyltin (TBT) on the marine environment leading to the implementation of national and global regulation to mitigate those impacts is often used as a prime example of successful science–policy interaction (Matthiessen, 2013). The Marine Biological Association (MBA) is understandably proud of the role it played in this story with important and influential research being carried out at the MBA's Laboratory in Plymouth and with key research on TBT and other contaminants being published in the *Journal of the Marine Biological Association of the United Kingdom* (Dando & Southward, 2020).

Tributyltin is just one of a number of Endocrine Disrupting Chemicals (EDCs), as discussed in this issue in the review by Langston (2020). The role of EDCs as a contaminant has a high profile from a marine management point of view, being among the list of pollutants with targets for prevention and reduction under the EU's Marine Strategy Framework Directive (MSFD) and also under the United Nation's Sustainable Development Goals (specifically under target 14.1, SDG 14). TBT is the best known but not the only contaminant where there has been success in terms of regulation with, for example, the recent (2018) UK assessment of progress towards Good Environmental Status (GES) targets in its North Sea and Celtic Sea Regions showing stable or improving trends for the majority of the assessed contaminant concentrations. The issue of contaminants regulation also provides a useful example of how marine biological research can be used to support a classic DPSIR framework approach (Driver-Pressure-State-Impacts-Response; see Patrício *et al*., 2016). Evidence from fundamental marine biological investigations is used to elucidate the 'impacts' and ongoing monitoring is used to monitor the 'state' of the environment or a component thereof with all information being used by regulators to manage the drivers and pressures through the appropriate response. The excellent research undertaken on species responses, in particular, also allows the development of appropriate indicators of state in areas of the coastal zone where most of the pressures occur.

Langston (2020) provides a comprehensive review of EDCs and similar contaminants, particularly with regard to impacts on marine invertebrates. It would appear therefore that with an extensive body of research carried out and evidence of improvements in the marine ecosystem, the pathway from scientific research to the development of appropriate regulatory frameworks and legislation is well-established and working well. As all scientists know, however, it is rarely that straightforward and if the ambitious targets under the MSFD and UN SDGs are to be met, then there is still much to be done. For a start there are ongoing challenges in terms of new chemicals and substances appearing (Zacharias & Ardron, 2019: 127) and these will require additional monitoring and investigation. Langston (2020) also highlights a number of knowledge gaps where further research is required including: additive/interactive effects of EDCs; cumulative impacts of multiple stressors; better understanding of the mechanisms leading to deleterious effects, particularly at the population level; the need for ongoing monitoring to better understand recovery; and the fact that more work is required specifically on marine invertebrates.

These gaps have not prevented appropriate measures being in put in place, however, which is an important point in light of recent trends towards governments requiring more and more evidence before taking action, with the issue of knowledge gaps sometimes being used as an excuse to delay providing an appropriate response. On a range of issues from climate change impacts to overfishing and Marine Protected Areas, the requirement for more research has sometimes been used as a reason to put measures on hold despite a significant body of research already in existence. The issue of EDCs shows us that there will always be knowledge gaps and there will always be new challenges but by acting on what we know now we can begin to move towards a more sustainable use of our seas and oceans.

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