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TITLE: DPSIR?Two Decades of Trying to Develop a Unifying Framework for Marine Environmental Management?

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ABSTRACT:

Determining and assessing the links between human pressures and state-changes in marine and coastal ecosystems remains a challenge. Although there are several conceptual frameworks for describing these links, the DPSIR (Drivers ? Pressures ? State change ? Impact ? Response) framework has been widely adopted. Two possible reasons for this are: either the framework fulfils a major role, resulting from convergent evolution, or the framework is used often merely because it is used often, albeit uncritically. This comprehensive review, with lessons learned after two decades of use, shows that the approach is needed and there has been a convergent evolution in approach for coastal and marine ecosystem management. There are now 25 derivative schemes and a widespread and increasing usage of the DPSIR-type conceptual framework as a means of structuring and analyzing information in management and decision-making across ecosystems. However, there is less use of DPSIR in fully marine ecosystems and even this was mainly restricted to European literature. Around half of the studies are explicitly conceptual, not illustrating a solid case study. Despite its popularity since the early 1990s among the scientific community and the recommendation of several international institutions for its application, the framework has notable weaknesses to be addressed. These primarily relate to the long standing variation in interpretation (mainly between natural and social scientists) of the different components (particularly P, S and I) and to over-simplification of environmental problems such that cause-effect relationships cannot be adequately understood by treating the different DPSIR components as being mutually exclusive. More complex, nested, conceptual models and models with improved clarity are required to assess pressure-state change links in marine and coastal ecosystems. Our analysis shows that, because of its complexity, marine assessment and management constitutes a 'wicked problem' and that there is an increasing need for a unifying approach, especially with the implementation of holistic regulations (e.g. European Directives). We emphasize the value of merging natural and social sciences and in showing similarities across human and natural environmental health. We show that previous approaches have adequately given conceptual and generic models but specificity and quantification is required.

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