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TITLE: ?And DPSIR begat DAPSI(W)R(M)!? - A unifying framework for marine environmental management

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ABSTRACT:

The marine environment is a complex system formed by interactions between ecological structure and functioning, physico-chemical processes and socio-economic systems. An increase in competing marine uses and users requires a holistic approach to marine management which considers the environmental, economic and societal impacts of all activities. If managed sustainably, the marine environment will deliver a range of ecosystem services which lead to benefits for society. In order to understand the complexity of the system, the DPSIR (Driver-Pressure-State-Impact-Response) approach has long been a valuable problem-structuring framework used to assess the causes, consequences and responses to change in a holistic way. Despite DPSIR being used for a long time, there is still confusion over the definition of its terms and so to be appropriate for current marine management, we contend that this confusion needs to be addressed. Our viewpoint advocates that DPSIR should be extended to DAPSI(W)R(M) (pronounced dap-see-worm) in which Drivers of basic human needs require Activities which lead to Pressures. The Pressures are the mechanisms of State change on the natural system which then leads to Impacts (on human Welfare). Those then require Responses (as Measures). Furthermore, because of the complexity of any managed sea area in terms of multiple Activities, there is the need for a linked-DAPSI(W)R(M) framework, and then the connectivity between marine ecosystems and ecosystems in the catchment and further at sea, requires an interlinked, nested-DAPSI(W)R(M) framework to reflect the continuum between adjacent ecosystems. Finally, the unifying framework for integrated marine management is completed by encompassing ecosystem structure and functioning, ecosystem services and societal benefits. Hence, DAPSI(W)R(M) links the socio-ecological system of the effects of changes to the natural system on the human uses and benefits of the marine system. However, to deliver these sustainably in the light of human activities requires a Risk Assessment and Risk Management framework; the ISO-compliant Bow-Tie method is used here as an example. Finally, to secure ecosystem health and economic benefits such as Blue Growth, successful, adaptive and sustainable marine management Responses (as Measures) are delivered using the 10-tenets, a set of facets covering all management disciplines and approaches.

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