

ID: W2796410914

TITLE: Essential ocean variables for global sustained observations of biodiversity and ecosystem changes

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ABSTRACT:

Abstract Sustained observations of marine biodiversity and ecosystems focused on specific conservation and management problems are needed around the world to effectively mitigate or manage changes resulting from anthropogenic pressures. These observations, while complex and expensive, are required by the international scientific, governance and policy communities to provide baselines against which the effects of human pressures and climate change may be measured and reported, and resources allocated to implement solutions. To identify biological and ecological essential ocean variables (EOVs) for implementation within a global ocean observing system that is relevant for science, informs society, and technologically feasible, we used a driver-pressure-state-impact-response (DPSIR) model. We (1) examined relevant international agreements to identify societal drivers and pressures on marine resources and ecosystems, (2) evaluated the temporal and spatial scales of variables measured by 100+ observing programs, and (3) analysed the impact and scalability of these variables and how they contribute to address societal and scientific issues. EOVs were related to the status of ecosystem components (phytoplankton and zooplankton biomass and diversity, and abundance and distribution of fish, marine turtles, birds and mammals), and to the extent and health of ecosystems (cover and composition of hard coral, seagrass, mangrove and macroalgal canopy). Benthic invertebrate abundance and distribution and microbe diversity and biomass were identified as emerging EOVs to be developed based on emerging requirements and new technologies. The temporal scale at which any shifts in biological systems will be detected will vary across the EOVs, the properties being monitored and the length of the existing time-series. Global implementation to deliver useful products will require collaboration of the scientific and policy sectors and a significant commitment to improve human and infrastructure capacity across the globe, including the development of new, more automated observing technologies, and encouraging the application of international standards and best practices.

SOURCE: Global change biology

PDF URL: <https://onlinelibrary.wiley.com/doi/pdfdirect/10.1111/gcb.14108>

CITED BY COUNT: 267

PUBLICATION YEAR: 2018

TYPE: article

CONCEPTS: ['Marine Strategy Framework Directive', 'Seagrass', 'Marine ecosystem', 'Biodiversity', 'Environmental science', 'Ecosystem', 'Marine conservation', 'Benthic zone', 'Biomass (ecology)', 'Ecology', 'Marine protected area', 'Environmental resource management', 'Marine spatial planning', 'Biology', 'Habitat']