

Towards the New Era of ocean science for the sustainable Indo-Pacific Region

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The Indo-Pacific Region (IPR), serving as a critical interface between the West Pacific Ocean and East Indian Ocean, encompasses diverse coastal ecosystems and maritime corridors. This biogeographically significant zone sustains the livelihoods of millions across multiple nations through its marine ecosystem services. Over the past two decades, scientific advancements have been achieved in IPR through enhanced field observations, methodological innovations, and digital data integration, supported by increased funding allocations from various stakeholders. Nevertheless, the region's exceptional vulnerability to climate change impacts, compounded by escalating anthropogenic pressures, reveals critical inadequacies in current oceanographic research frameworks to address sustainability challenges across local to national scales.

This report highlights pivotal scientific advancements in ocean science relevant to sustainable development in IPR, such as biogeochemical nutrient flux dynamics, progressive ocean acidification patterns, and ecosystem structural resilience mechanisms. Furthermore, fundamental challenges impeding science-policy integration are discussed, including technological limitations in observational infrastructure, disparities in regional research capabilities, and fragmented data management systems. To bridge these gaps, a strategic research agenda within the framework of ocean science is suggested for the future, emphasizing the development of adaptive monitoring and lab determination technologies, the implementation of multilateral capacity-building initiatives, and the establishment of integrated data platforms with standardized protocols. These recommendations underscore the urgent need for paradigm shifts in marine research approaches to effectively support evidence-based governance and sustainable resource management in the IPR.