

Translational Molecular Ecology in practice: Linking DNA-based methods to actionable marine environmental management.

EvaAylagas¹, AngelBorja², XavierPochon^{3,4}, AnastasijaZaiko^{3,4}, NigelKeeley⁵, Kat Bruce⁶, PeiyingHong⁷, Gregory M. Ruiz^{8,9}, Eric D. Stein¹⁰, Susanna Theroux¹⁰, Nathan Gerald¹, Alejandra Ortega¹, Laura Gajdzik¹, Darren J. Coker¹, Yasser Katan¹¹, Tyas Hikmawan¹¹, Ammar Saleem¹², Sultan Alamer¹², Burton H. Jones¹, Carlos M. Duarte¹, John Pearman³, Susana Carvalho¹

¹Red Sea Research Center, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

²AZTI, Marine Research, Basque Research and Technology Alliance, Herrera Kaia, Pasaia, Spain

³Coastal and Freshwater Group, Cawthron Institute, Nelson, New Zealand

⁴Institute of Marine Science, University of Auckland, Warkworth, New Zealand

⁵Benthic Resources and Processors Group, Institute of Marine Research, Tromsø, Norway

⁶Nature Metrics Ltd, CABI site, Bakeham Lane, Egham, United Kingdom

⁷Water Desalination and Reuse Center, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia

⁸Smithsonian Environmental Research Center, 647 Contees Wharf Road, Edgewater, MD

⁹Aquatic Bioinvasion Research and Policy Institute, Environmental Science and Management, Portland State University, Portland, OR

¹⁰Southern California Coastal Water Research Project, 3535 Harbor Blvd., Suite 110, Costa Mesa, CA

¹¹Environmental Protection Department, Saudi Aramco, Dhahran, Saudi Arabia

¹²The General Authority of Meteorology and Environmental Protection, The Ministry of Environment, Water and Agriculture, Saudi Arabia

ABSTRACT

Molecular-based approaches can provide timely biodiversity assessments, showing an immense potential to facilitate decision-making in marine environmental management. However, the uptake of molecular data into environmental policy remains minimal. Here, we showcase a selection of local to global scale studies applying molecular-based methodologies for environmental management at various stages of implementation. Drawing upon lessons learned from these case-studies, we provide a roadmap to facilitate applications of DNA-based methods to marine policies and to overcome the existing challenges. The main impediment identified is the need for standardized protocols to guarantee data comparison across spatial and temporal scales. Adoption of Translational Molecular Ecology—the sustained collaboration between molecular ecologists and stakeholders, will enhance consensus with regards to the objectives, methods, and outcomes of environmental management projects. Establishing a sustained dialogue among stakeholders is key to accelerating the adoption of molecular-based approaches for marine monitoring and assessment.

Due to distribution restrictions, the full-text version of this article is available by request only. Please contact pubrequest@sccwrp.org to request a copy.