

Supplementary Information for “A blueprint for integrating scientific approaches and international communities to assess basin-wide ocean ecosystem status”

Supplementary Note 1 The deep and open ocean policy landscape

There are many international initiatives, directives and agreements to tackle issues threatening the health of ocean ecosystems. These include, amongst others, the United Nations 2030 Agenda for Sustainable Development and associated Sustainable Development Goals (SDGs) and the SIDS Accelerated Modalities of Action (SAMOA) Pathway, the UN Framework Convention on Climate Change (UNFCCC), the UN Convention on Biological Diversity (CBD) Biodiversity Strategy and post-2020 Global Biodiversity Framework, the UN Food and Agriculture Organisation (FAO) International Deep-Sea Fisheries Guidelines, the International Seabed Authority (ISA) mining codes and regional environmental management plans, the European Union’s Biodiversity Strategy, Marine Strategy Framework and Marine Spatial Planning directives, the EU’s Deep-Seas Fisheries Agreement, and the current negotiations on an international legally binding instrument for the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction (BBNJ) under the UN Convention on the Law of the Sea (UNCLOS). All depend on actionable transformational knowledge.

Atlantic regional fisheries management organisations (RFMOs) also have the mandate to manage deep-sea fisheries on the high seas to protect deep-sea ecosystems through the implementation of UN General Assembly resolutions and FAO International Deep-Sea Fisheries Guidelines. These are continually reviewed in light of new scientific information on the status of deep-sea ecosystems. More recently, EU Regulation 2016/2336 was adopted for the management of deep-sea fisheries within European waters as well as for EU vessels fishing on the high seas of the central eastern Atlantic, a regulation that requires annual review of scientific information on the impact of bottom fisheries on deep-sea ecosystems. Both the EU regulations and the international fisheries bodies have been called on to manage deep-sea fisheries in light of the cumulative impacts from anthropogenic activities. Compounding these existing pressures, the potential impacts of deep-sea mining, as regulated by the International Seabed Authority (ISA), may place further stress on deep-sea and open-ocean ecosystems with a regulatory ‘Mining Code’ currently being developed by the ISA.

Supplementary Table 1

Illustrative costs required to resource a 30-day sea-going expedition including both costs at sea and to complete analyses after the expedition. Post-expedition staff costs have been included based upon staffing estimates derived from personnel costs in Europe, South America and South Africa.

	High Seas expedition with ROV, AUV and lander capability	High Seas expedition with low-cost imaging and CTD	Shallow water coastal expedition with low-cost imaging and CTD
Ship (€20k/day, not counting purchase capital expenditure)	€600,000	€600,000	€20,000
ROV (€10k/day)	€300,000		
AUV (€5k/day)	€150,000		
Lander (€2k/day)	€60,000		
In situ sampling (€4k/day)	€120,000		
Drift cam (€0.5k/day)		€15,000	€5,000
CTD (€0.5k/day)		€15,000	€5,000
Cost of a single expedition execution	€1,230,000	€630,000	€30,000
Person-years needed to complete scientific processing (QA, archive, analysis, interpretation) ¹	10	4	1
Work-up costs EU & UK	€458,333	€183,333	€45,833
Work-up costs S. Am	€225,000	€90,000	€22,500
Work-up costs SA	€233,333	€93,333	€23,333
Total costs in EU	€1,688,333	€813,333	€75,833
Total costs in S. Am.	€1,455,000	€720,000	€52,500
Total costs in SA	€1,463,333	€723,333	€53,333

¹ All personnel costs assuming 1 Principal Investigator, 2 post-doctoral researchers, 3 PhD students with time allotted pro-rata (0.16 full-time equivalent staffing).

ROV, remotely operated vehicle; AUV, autonomous underwater vehicle; CTD, conductivity temperature depth sensor package; EU, European Union and UK; S. Am., South America; S.A. South Africa.