Deep sea

Needs and gaps in policies for innovation in exploration and extraction in Europe

Paul Lusty, British Geological Survey

MIN-GUIDE Policy Laboratory 2: Innovation and supporting policies for minerals exploration and extraction

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"Blue Growth: opportunities for marine and maritime sustainable growth", 2012:

- **2020:** 5% world’s minerals from oceans, **2030:** 10%
- Global turnover marine mining grow virtually nothing to **€5B** next 10 years, up to **€10B** 2030
The challenge

How can effective governance arrangements be developed for a vast, mostly unexplored area that is part under national jurisdiction and part global commons, governed under fragmented institutions with little coordination?

(Moore and Squires, 2016:
Global Environmental Politics)
Defining characteristics of the deep sea

- **Vast biome** (~60% earth surface), with corresponding significance for the earth system (e.g. sequestering CO$_2$, nutrient recycling)

- **Remote** (distance land/depth, average = ~4.0 km): very poor knowledge (~5% explored) = pervasive scientific uncertainty, in contrast to many terrestrial environments & paucity of baseline data for deep ocean ecosystems

- **Huge predicted resources** (energy, minerals, marine organisms [MGR, millions of undescribed species], but great uncertainty over magnitude, accessibility, economic importance
  - Seafloor likely to contain a metal endowment proportionate to its area. Scale activity already significant: ISA approved 26, 15 year contracts for exploration, each covering up to 150,000 km$^2$
Challenges

• Rapidly improving access (robotics, surveying technology, engineering)

• Faces mounting challenges from numerous, cumulative, and sometimes competing directions (fishing, energy, waste disposal, land-based pollution) → mining/MGR

• Governance of the deep ocean is fragmented into a number of areas under varying jurisdictions

• Currently a single sector approach to ocean management
Potential for acute conflict between economic development and environmental degradation

- Seamounts – significant resources of Fe-Mn crusts, benthic fauna (MGR potential), fish populations

- How do you weigh the value of one resource type over another?

*Benthic fauna on Fe-Mn crust, Tropic Seamount: November 2016*
Addressing the knowledge gaps

• “We are quick to judge, fear and even hate the unknown”: how can you protect yet-to-be-discovered species, habitats and functions?

• But we are making progress: research is established e.g. ISA publications, EC-funded projects (e.g. Blue Mining/MIDAS), nationally-funded research programmes e.g. MarineE-tech (http://projects.noc.ac.uk/marine-e-tech/)

But, deep ocean exploration is very challenging and expensive!
MarineE-tech: novel plume experiments, Tropic Seamount, north east Tropical Atlantic

First real-time, deep sea, seamount-based monitoring of plume dispersal
Battling perception and the legacy of poor ocean management

• Natural suspicion: historically the deep sea has acted as an intentional dumping ground (e.g. rad waste, toxic chemicals, mine tailing)

• Hydrocarbon sector: research demonstrated link between > water depth and accident rates

• The scale of human impacts on the ocean are becoming increasingly evident e.g. “Microplastics in the sea a growing threat to human health, United Nations warns” Independent May 2016

We will naturally be cautious and should ask many questions
Analogies will be drawn to other resource types: deep sea fisheries

- Fisheries frequently cited as a classic example of poor resource management: over exploitation; habitat loss; weak, international guidelines for the high seas:
  - Regulation has proven challenging
  - Fishery industry pressure meant some conservation measures with a strong scientific basis were not adopted
Deep sea minerals current management framework: a positive outlook, but…

• Seabed beyond the continental shelf: “common heritage of mankind”: revenue from mining activities is meant to benefit all countries, especially the least-developed – a commendable, but considerable promise!

• Although still evolving, the outlook for the preliminary framework governing management of deep sea minerals appears more positive than for fisheries
…challenges ahead and many questions

• ISA responsibility limited to deep sea mineral resources:
  – Who will take a **holistic view of all deep sea resource types** and economic activities (e.g. fishing, shipping), currently covered sector-specific arrangements?, and therefore

• Who will manage interaction between competing sectors and **resolve potential resource use conflicts** (e.g. fishing and energy extraction industries already clash over exploitation)?

• Overlapping uses and multisector activities generate **cumulative impacts** that are difficult to monitor/quantify

• Monitoring, compliance and enforcement of environmental management plans and agreements will be challenging:
  – Is self enforcement realistic?
  – What types of third party monitoring programmes are realistic?
Frequently overlooked in the debate

• It may be a frontier, but is not a pristine environment: already experiences impacts from many activities (e.g. fishing; hydrocarbon sector; waste disposal; and land-based pollution) and humans have had significant impacts for decades

• Terrestrial resource use also has major impacts

• We currently lack the knowledge to make direct comparisons with land-based resource extraction:
  – Vital to consider the entire lifecycle and value chain of a resource to make valid comparisons

• Although the deep sea presents unique challenges, mineral extraction on land is one of the most closely regulated industries
The way forward – a welcome opportunity rather than a burden

• Almost unique opportunity to develop a policy framework in **advance of exploitation and associated impact**

• Huge **science/research opportunity** to address the pervasive lack of base-line data and uncertainty, to support more robust decision making and policy development

• **Pervasive uncertainty**, therefore many advocate a ‘**precautionary approach**’
Future focus I

1. **Research, modelling & scientific understanding**: we lack fundamental information and baseline data on many aspects of the deep sea, which inhibit development of effective policies.

2. **Protection & mitigation**: improved knowledge of deep sea environments should inform development of mining strategies and selection of protected areas.
   - What are acceptable levels of ecosystem recovery and what sort of timescales should be considered?
   - Requirements for an adaptable and pragmatic approach to EIA – one size fits all may not work for the deep sea.
3. **Governance**: current single sector approach cannot ensure balanced resource use:
   - More international and regional-scale collaboration
   - Multi-sector marine spatial planning
   - Closer collaboration with industry

4. **Innovation and technology**:
   - Adoption of land-based technologies is obvious and logical, but is a step change in approach/technology needed?
   - Developments in autonomous vehicles and sensors will make real-time monitoring of operations more feasible
   - Technology pioneers in this sector favour strong, but effective environmental regulation, as equipment compliance or environmental performance may represent a company's future technical edge
Conclusions

• As with all forms of contentious land-use breaking through the ‘perception barrier’ may be the largest challenge

• Deep-ocean mining: not a “gold rush” but an increasingly likely proposition – so despite many challenges, better to approach informed, to allow smart decision making

• Time scale to development: economic determination and/or security of mineral supply concerns are probably the reality/drivers in the short-medium term

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