EU stakeholder survey on seabed mining: summary of responses
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EXECUTIVE SUMMARY

Until recently nearly all mankind’s needs for non-living materials for agriculture, construction and manufacture were obtained from land. Now extraction of sand and gravel from the seabed is a thriving industry, mines for minerals such as potash extend offshore and licences have been granted for the exploration and extraction of minerals from the deep ocean floor. The aim of this consultation was to gauge opinion on these activities and to assess what stakeholders thought the EU’s attitude and role should be.

There were 208 replies to the on-line consultation with a good representation from public authorities, industry, researchers and civil society. In addition, one public authority did not reply to the on-line questions but sent a contribution by letter. The civil society replies were largely from environmental groups who were in favour of reducing current extraction activities, preventing new ones and increasing recycling and were more inclined to push for legislative rather than a voluntary approach than the other stakeholders. 515 members of the public, mostly with identical wording, also conveyed a similar message. Nevertheless, on the whole, the recommendations from this group – more research, increased transparency, tighter standards better maps – were not so different from those of the other stakeholders.

At this point it is worth noting that "increasing recycling" was not included as an option for EU action in this consultation because boosting resource efficiency and recycling is a separate pillar of the Raw Materials Initiative.

Most stakeholders thought that dredging for sand and gravel was less damaging to the environment than oil and gas extraction but worse, or about the same, depending on where and how it is done, to fishing and extraction from the land. Industry and public authorities pointed out that taking sand and gravel from the sea for beach nourishment or construction near the coast can reduce environmental damage from transporting the material overland and, in the case of beach nourishment, deliver material similar in nature to that which has been eroded.

Some respondents from civil society were not only concerned about the seabed but also about the practice of beach nourishment itself which they thought damaged coastal habitats. Researchers and public authorities, on the other hand, considered it essential for managing erosion.

A significant number of respondents pointed out that insufficient measures are in place to document and protect underwater cultural heritage artefacts discovered during offshore activity in shallow water. Unlike ecosystems, these artefacts are unlikely to recover following their disturbance.

The main economic driver for deep sea mining is cost. According to the respondents, it is equally likely to take place in the Area as in jurisdictional waters. Investors will invest if they believe that the reduction in processing cost due to higher concentrations of metal in the ore than from terrestrial sources will compensate for the uncertain, but almost certainly increased, cost of extraction.

The seabed ecosystems will be disturbed by the extraction of material and the resuspension of particles. Many respondents considered the comparison of the environmental impacts of mining with other activities as being too simplistic. It needs to be assessed on a case by case basis. However, some thought that the disturbance might be less than for terrestrial mines because less overlying material needs to be removed, the processing requires less energy and creates less waste and no new roads or railways need be built; others pointed to the much...
larger areas disturbed by mining for nodules as compared to mining on land. Little is known about recovery times of these ecosystems but the respondents indicated that the area covered by sulphide mining from active or passive hydrothermal vents is likely to be much less than for manganese nodules and the impact accordingly lower.

The general opinion was that legislative measures for mining in waters subject to EU environmental rules are adequate but that there is scope for better enforcement and more harmonisation. The respondents were aware that scope for EU action in international waters or waters of third countries is limited but that EU-based companies should set a good example and adopt a precautionary approach. The EU should contribute to understanding best practice, the most appropriate technologies and environmental impact through its research programmes. Ongoing exploration efforts should feed into better maps of seabed ecosystems and the results of monitoring the first extraction projects should be made widely available in order that appropriate lessons be learned for subsequent activities.
1. THE CONSULTATION

Seabed mining covers three broad activities:

(1) extraction of aggregates – sand and gravel – for the construction industry and for nourishing beaches;

(2) other material extracted from shallow water down to about 500 metres depth including tin, phosphates, iron ore and diamonds;

(3) deep-water mining targeting manganese nodules, polymetallic sulphides, cobalt-rich crusts, rare earth element-rich deep-sea sediments.

The technical, legal and environmental issues are substantially different in each of these cases so respondents could choose to answer questions on only the activity or activities they were involved in or had an opinion on.

The consultation was opened on 17 March 2014 and closed on 20 June, 2014. It was published on the DG-MARE web-site and available in all the EU languages except Irish and Maltese. It was also announced through a number of specialist publications. The respondents were invited to answer a set of questions. In general they followed the pattern of a multiple choice question followed by an invitation to explain their response in free text format.

A draft of this summary was afterwards distributed to the respondents in order to check that it accurately reflected their opinions. This revised version incorporates a small number of points that were raised.

2. THE RESPONDENTS

There were 208 replies – 90 of these were official replies from organisations and the other 118 from individuals.

The respondents were classified under four broad categories – public authorities, private bodies, researchers and civil society.

Many of the individuals replied on the basis of their affiliation and were classed as such. Thus those working in research laboratories were included under "research" even though they were not officially representing their institute. They could, however, choose to reply as individuals and were then counted under "civil society".
Figure 1: Summary of replies categorised by country and stakeholder community

Figure 1 summarises the contributions, sorted by country and stakeholder community. This shows a good representation of European stakeholders. There were also a limited number of replies from outside Europe, mostly from the industrialised world – Australia, Canada, Japan, United States, – but also Morocco, Papua New Guinea and the Kingdom of Tonga. More details are given in Table 1 of the activities covered.

Table 1: background of respondents to survey

<table>
<thead>
<tr>
<th>Type</th>
<th>Official Capacity</th>
<th>Personal Capacity</th>
<th>Total</th>
</tr>
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<td>Both environmental and human rights issues</td>
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<td>1</td>
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<tr>
<td>Broader than environmental and human rights issues</td>
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<td>.</td>
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<tr>
<td>Primarily concerned with development issues</td>
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<td>1</td>
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<tr>
<td>Primarily concerned with environmental issues</td>
<td>14</td>
<td>10</td>
<td>24</td>
</tr>
<tr>
<td>Primarily concerned with human rights issues</td>
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<td>.</td>
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<tr>
<td>Private Individual</td>
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<td>Medium-sized Enterprise (51-250 employees)</td>
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<td>Small Company (11-50 employees)</td>
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<tr>
<td>Micro-entity (up to 10 employees)</td>
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<tr>
<td>Subtotal</td>
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<tr>
<td><strong>Public Authority</strong></td>
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<tr>
<td>Subtotal</td>
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Figure 2 shows that more researchers and private companies replied to questions concerning deep-sea mining than on the other issues. Representatives of civil society were interested in all three categories, with a slight preponderance of replies to the questions on deep sea mining. Public authorities showed more interest in aggregates. This is not surprising as it is expected that most deep sea mining operations will almost certainly take place outside the jurisdiction of most EU Member States – either in international waters or waters of third countries.

Figure 2 indicates how many respondents answered questions on each of the three categories of mineral extraction.

Complete replies, sorted both by question and respondent are available on the web-site of the European Commission’s Directorate General for Maritime Affairs and Fisheries3.

In addition a number of respondents replied directly by e-mail.

– The French Authorities provided their opinion in a note to the European Commission.

– 515 others replied by e-mail. Some contributed more than once. There were therefore a total 730 separate messages. A number used a standard text in one or more messages. There were 77 distinct messages. They were all along the same lines as the replies from the

civil society organisations whose primary interest is protection of marine ecosystems from human activity.

These messages are posted along with the other replies on the Directorate General for Maritime Affairs and Fisheries website.

3. MINING FOR AGGREGATES

Aggregates – sand and gravel for construction or beach nourishment – can be extracted from shallow waters. In some countries, a significant proportion of needs are met from this source.

1.1. Is this a useful way of maintaining an adequate supply of material for construction and beach nourishment?

Industry, researchers and public authorities largely agreed that aggregate extraction from the sea can help meet the needs of the construction industry and coastal authorities for sand and gravel. Civil society stakeholders were less convinced; the majority feeling that it was unnecessary.

The National Board of Antiquities of Finland pointed out that any areas should be thoroughly scanned in advance, not only for environmental impact, but also for possible damage to artefacts and landscapes of archaeological or cultural value.

The arguments against aggregate extraction from the sea were not only about the impact on marine life on the sea floor, although this was mentioned, but rather on the practice of beach nourishment itself. Birdlife Europe felt that the extraction may exacerbate the erosion that generates the need for nourishment in the first place, that the deposited material might be of a different granularity than the original material and that biological communities are disturbed in the places where sand is deposited. They suggested that better use of natural vegetation and reduced coastal development would reduce the need for nourishment and that the percentage of construction material recycled could be raised from 45% to 90%.

TNO, the Geological Survey of Netherlands, argued that the Netherlands would not manage without it. As access to land resources has become increasingly more restricted,
increasing proportions of aggregates come from offshore domain. The coastal provinces are now largely supplied with marine sand and beaches are nourished with marine sand extracted from waters as close as possible to the nourishment site. EuroGeosurveys also pointed out that terrestrial resources are running out. Flanders Marine Institute highlighted the desirability of matching the characteristics of the extracted sand with that of the beach where it should be deposited.

The British Marine Aggregate Producers Association (BMAPA) indicated that in Great Britain, 27% of demand for construction is met from recycling secondary sources and about 6% from the sea. Marine aggregates can be particularly advantageous for coastal areas because it reduces the congestion, pollution and carbon footprint arising from transporting them by land. The Belgian Jan de Nul Group also pointed this out.

1.2. What (if anything) is limiting the economic potential of this activity?

Figure 4 replies to question concerning limits to growth in activity

The private companies, researchers and public authorities consulted all felt that opposition from other users of the sea, such as fishermen, was the strongest factor limiting growth of offshore aggregate extraction. After this came local opposition and over-stringent and over-bureaucratic licensing. Access to finance, knowledge of whereabouts of deposits, volatility of prices, taxation and availability of skilled labour were seen as lesser problems. Marine Planning Consultants from the UK said that licensing is costly and complex. A respondent working for a German public authority said that many potential sites are in protected areas. The French Authorities reported that the Xynthia storm and construction of windfarms had increased local opposition to new developments. Aggregate extraction is moving further offshore to deeper waters where larger boats and more powerful equipment were needed.

Although lack of knowledge of the whereabouts of deposits was not considered a critical issue, the National Oceanography Centre at Southampton considered that better knowledge of fish spawning sites could allow better assessments of potential impact on the ecosystem.

Civil society, largely because they did not see the need for the activity to grow, mostly did not have an opinion on the matter. For instance Seas at Risk thought that if
environmental impact were properly accounted for, it would be uneconomic to extract aggregates from the sea.

1.3. The environmental impact of aggregate extraction

![Figure 5 environmental impact compared to other activities](image)

Aggregate extraction clearly has an impact on the ecosystems and work has been done to understand and minimise it. The aim of this question was to understand how severe stakeholders considered this extraction of aggregates compared to other activities.

Many thought the question too simplistic. A number of civil society representatives, for instance Bird life International, Seas at Risk and Oceana thought the question "inappropriate and poorly formulated". Seas at Risk wrote "the impacts of all sectors are highly dependent on the scale, location, carrying capacity of the ecosystem, and cumulative effects with activities. The environmental impacts can therefore not be compared at this generic level".

However, unlike the previous question where many answered "no opinion" most respondents from all stakeholder groups did answer the question. On balance the public authorities considered fishing, terrestrial mining, aggregate mining and offshore oil and gas extraction as equally damaging to the environment. All the others - civil society, researchers and private bodies – believed oil and gas extraction to be the most damaging of all activities by some margin, although, as pointed out by the "Département des Recherches Archéologiques Subaquatiques et Sous-marines" of the "Ministère de la culture, France", it covers a smaller area.

There was more variety in ranking the impact of the others. Researchers and civil society tended to believe that aggregate extraction was worse than fishing or mining on land. Private bodies, 65% of whom were involved in aggregate mining themselves, thought aggregate extraction to be more benign than either.

Some pointed out that the impact spreads beyond the extraction site. The International Forum for Sustainable Underwater Activities did not approve of enhancing the tourist appeal of pebble beaches with sand. Regione Lazio, on the other hand, reported that
their environmental impact assessments showed that shifting sand from sea to land is only an enhancement of natural processes.

The UK’s National Federation of Fishermen’s Organisations thought that mid-water trawling would have less impact than gravel extraction. Recovery times after bottom trawling may be more, less or similar to gravel extraction depending on where or how it is done. The UK’s National Oceanography Centre thought that aggregate extraction would be less damaging because it is limited to licensed areas which are smaller than areas where bottom-trawling is permitted. The French authorities considered that the impact on coastal erosion needs further study.

1.4. **What EU action would be helpful?**

![Figure 6 reply to question as to what EU action would be useful](image)

There was a general agreement that, since there was no real shortage of skilled labour: this was not a priority area for action. The Dutch "Ministerie van Economische Zaken", on the other hand, considered that in one particular case action was justified. They thought that the EU should insist on reciprocal recognition of diving qualifications – not only in support of offshore infrastructure but also in support of protection of ecosystems or exploration of underwater cultural heritage. Currently diving certificates and medical requirements differ between countries.

Research into dredging technology was likewise not given a high priority.

There was, on the other hand, agreement from all stakeholder groups- public, private, researchers and civil society - that the EU should support seabed mapping and research into environmental impact. The Natural Environment Research Council of the UK thought research into recovery times for ecosystems would contribute towards the determination and regulation of permissible levels of disturbance. The French *Département des Recherches Archéologiques Subaquatiques et Sous-marines. Ministère de la culture* were concerned that the "tremendous impact of these activities on the underwater cultural heritage had been forgotten." The Finnish Board of Antiquities agreed that maps on underwater cultural heritage would be useful. Birdlife Europe wanted more research in recycling building materials in order to reduce the need for offshore material.
There was more diversity of views on the necessity of strengthening environmental legislation. Support for this was strongest amongst the civil society respondents. The Greek World Wildlife Fund though that soft-law approaches, such as exchange of best practice, do not work effectively. The French authorities believe that national legislation is sufficient and pointed out that work is in progress to define how the activity should develop in the medium term, taking into account the constraints of spatial planning. However, nobody suggested any concrete measures that needed to be taken other than increasing the number of marine protected areas. Rather they emphasised the tougher implementation of existing legislation such as the Birds Directive, the Habitats Directive, the Marine Strategy Framework Directive or the Maritime Spatial Planning Directive.

4. SHALLOW-WATER MINING

Material extracted from shallow water down to about 500 metres depth includes tin, phosphates, iron ore and diamonds. These materials, washed out by rivers, can often be found near the shore.

Unlike aggregate extraction, there is not a significant amount of activity in European waters. The companies replying to the consultation were largely involved in providing equipment rather than conducting operations. The technology required is similar to dredging – one of the success stories of European shipbuilding.

1.5. What (if anything) is driving economic interest?

Researchers and public authorities thought that limited access to terrestrial raw materials was the main reason for increasing interest in shallow-water mining whereas civil society thought it was advances in technology. The private sector thought both factors equally important.

DEME NV, who are involved in many engineering and legal aspects of offshore work argued that companies are looking offshore because the land-based resource industry is facing declining ore grades, unstable social-political host countries, no new discoveries and increasing capital costs for underground mining. Another respondent, working in Australia for a private company thought that offshore mining offered a convenient...
location for shipping the material as opposed to remote inland sites with poor rail or other transport links.

The Jan de Nul Group, a dredging contractor, consider that current technology allows for extraction up to about 150 metres water depth. Soil Mechanics Limited, a manufacturer of remote intervention equipment in hazardous environments, said that the type of equipment required would depend on the type of deposits. Dredging can handle shallow softer deposits but for deeper harder material, equipment derived from their remotely operated subsea trenching equipment would be more appropriate.

The civil society groups considered the issues of sea resources to be similar to those on land. They are finite. We should recycle more.

1.6. could this contribute towards a sustainable and economical supply of raw material for EU industry and agriculture?

![Diagram showing frequency of answers]

*Figure 8 the benefits to society for seabed mining*

The public authorities and researchers thought that, on the whole, shallow-water mining was useful rather than essential whereas the number of private bodies considering it essential was slightly greater than those thinking it useful.

For instance DEME NV said that "Given the world population has more than tripled in the last 100 years (from 2 to 7 billion) and is expected to reach 9 billion by 2030, we have no choice to look for alternative sources for commodities. Furthermore, urbanisation will increase the pressure on base metals used in the construction industry. Last but not least, zero or low carbon emission energy sources (wind and solar energy) have a higher steel intensity than conventional fossil fuel energy sources."

European Dredgers said that current technology allows economic extraction down to about 150 metres. IHC Merwede B.V, a manufacturer dealing in construction of ships, offshore platforms and extraction technology thought that deposits in shallow waters provide high grades but extraction and logistic issues require technology development to enhance the technical and economic feasibility of mining commodities in the 200m to 500m water depths.
The majority of civil society thought it unnecessary and that more could be done on recycling. BirdLife were particularly concerned about phosphorus. Increasing recycling of manure, waste water, bones, food and other green waste through composting and the use of ashes would not only reduce the need for mining but would cut the amount going into the sea and stimulating algal growth. Another respondent said that diamond mining in South Africa and Namibia had been a disaster for the marine ecosystem without explaining what the harm was.

1.7. **Which shallow water deposits do you think will become economically interesting in the next 10 years?**

![Figure 9: The most significant materials that could be extracted from shallow-water mining](image)

Whereas civil society respondent believed that the emphasis would be on rare earths, most stakeholders believed that phosphates offered the best prospects. A respondent from an Australian company said that tin, gold and diamonds are already mined offshore. The feasibility of extracting phosphates and iron sands is being investigated.
1.8. What (if anything) is limiting the economic potential of this activity?

There were mixed opinions on this. The civil society generally did not express an opinion because they thought that the question was posed under the assumption that economic activity on shallow-water mining was desirable.

The private companies and researchers declared that opposition from local communities and other users of the sea were the primary threat to growth. The researchers suggested that lack of knowledge of the whereabouts of deposits and technology shortcomings were of equal importance. The private sector acknowledged their relevance but thought limited access to finance to be a more pressing need. Eurogeosurveys thought it difficult to give a global answer. Rather it should be answered nationally or regionally as the circumstances - legal, environmental, social, technical and deposit related - differ.

GEOMAR said the major drivers in all cases are commodity price and cost of exploitation, together with the size, quality, and accessibility of the resources. Some knowledge of impacts can be gained by looking at ongoing projects. Unlike deep-sea mining, shallow-water extraction is already happening.
1.9. The environmental impact of shallow water mining

Nearly all respondents thought the question difficult because the impacts are very different. GEOMAR asserted that very few "objective studies had been published. Civil society respondents again thought the question presumptuous but anyway answered it. The aim was not to ask what the environmental impacts were and whether they are acceptable. There are scientific and legal means of answering these. Rather it is to identify stakeholders' beliefs about threats to the marine environment.

It should be borne in mind that not all the respondents to this question had replied to the ones on aggregate extraction and vice versa. Most stakeholders believed seabed mining extraction to be relatively the most destructive except for public authorities who also considered oil and gas extraction a threat and private bodies who thought that seabed mining was less harmful than fishing or terrestrial mining.

The Deep Sea Mining Campaign thought that large scale mining, such as that proposed for the Tasman seabed, could increase coastal erosion. Birdlife Europe pointed out that plumes from mining might not only harm marine life but also damage fishing and tourism.

Ocean Network Canada noted that physical habitats disturbed by fishing take longer to recover than biomass removed by fishing.

DEME NV said that, in certain cases, sea-bed mining causes less damage than terrestrial mining. For instance the material lies on the surface, there is no need to drill through the overburden and no risk of polluting freshwater aquifers. Material can be transported from the mine in an environmentally friendly way. There is no need to build a railway or roads.

As in the case of aggregates, some respondents, such as the Geological Survey of Sweden, thought that bottom trawling was worse because it covered a bigger area.
1.10. What EU action would be helpful?

Figure 12 priorities for EU action for shallow-water mining

Few respondents thought that the EU needed to take additional measures on mobility of labour.

On the other hand, research was a priority for all respondents, not only the researchers. Research on environmental impact was the most requested but research on technology was also seen as being helpful.

All the other suggestions, seabed mapping, exchanges of good practice were considered useful.

Most supported an improvement in environmental legislation though there were few concrete suggestions as to what should be done. The Jan de Nul Group suggestion to allow limited scale pilot projects with less stringent constraints in order to see in practical terms what the impact would be. Soil Machine Dynamics agreed that pilot projects rather than "paper studies" were what was needed. The European Dredging Association (EuDA) thought that there was scope for clarification, harmonisation and avoidance of duplication that would not only help protect the environment but also save costs for business.

The Belgian Sea First Foundation introduced maritime spatial planning as an addition area where the EU could help but did not advocate measures beyond what has already been done in this area.

The Moana Nui Action Alliance, from the United States, was concerned about the rights of indigenous people in the Pacific being trod on by the EU's entering into trade agreements that allowed foreign corporations to skirt domestic courts and directly challenge any policy or action of a sovereign government before World Bank and UN tribunals. They considered that extractive agreements with governments should include "processes inherent in customary structures".

5. MINING IN DEEP WATER
Deep seabed mining has been arousing interest since the 1960s but no commercial mining activity has yet begun. However, in the last decade interest has increased. Operations would be controlled from a floating platform at the sea surface and target one of four broad classes of deposits:

- polymetallic nodules;
- polymetallic sulphides;
- cobalt-rich crusts
- rare earth element-rich deep-sea sediments

The regulations governing such activities depend on whether they take place inside or outside the jurisdictional waters of a sovereign state.

As regards the law applicable to such activities, the United Nations Convention on the Law of the Sea (‘UNCLOS’) distinguishes between deep-sea mining in: (a) maritime zones under the jurisdiction of coastal States (including the territorial sea, exclusive economic zone and continental shelf); and (b) the seabed, ocean floor and subsoil beyond national jurisdiction (which is defined in article 1 of UNCLOS as the ‘Area’).

Coastal States have exclusive sovereign rights to explore the seabed of maritime zones under their jurisdiction and to exploit the natural resources located there, including mineral resources, in accordance with their own legislation. As regards the EU Member States such legislation must give effect to obligations created under EU law.

All rights in the mineral resources of the Area are ‘vested in mankind as a whole’. The International Seabed Authority (ISA), an intergovernmental body established under UNCLOS is responsible for regulating deep-sea mining in the Area. ISA has the mandate to organize and control activities of the Area, particularly with a view to administering the resources of the Area, to regulate seabed mining and to ensure the protection of the marine environment in the Area in relation to such activities.
1.11. could this contribute towards a sustainable and economical supply of raw material for EU industry and agriculture?

Figure 13 benefits of deep sea mining for society

The majority of respondents, with the exception of those from the civil society community, indicated that deep sea mining did have a useful role to play in providing Europe with a sustainable supply of raw materials.

The civil society stakeholders argued that seabed mining was not compatible with the EU’s resource efficiency drive and that we should not engage in destructive activities in an environment that we know little about. Oceana thought there should be a moratorium. Birdlife Europe noted that "waste recycling and reduction creates jobs and business opportunities and can be encouraged by promoting companies to develop effective take-back schemes for old electronic devices. Companies could also be promoted to design products that minimise the use of minerals and have longer lives."

Others felt that whilst increased recycling is indeed a worthy ambition, it is not going to meet all our needs and the choice is rather whether we continue relying exclusively on terrestrial mining or turn to the sea for some of our needs. Eurogeosurveys thought that "although the availability of most land-based resources is secure for the next decades, the supply of certain metals such as cobalt and REEs is at risk due to political instabilities or protectionism in the countries of origin. Deep-sea resources can contribute significantly to diversification and show comparably high grades of certain metals (e.g. copper), but will most likely not cover the entire demand for the metals required to supply EU industry". This opinion was shared by other such as GEOMAR and the German Institute for Advanced Sustainability Studies. The French Technips company wrote "Like energy, mineral resources are key to the development of industrial economies. The accessibility and affordability of raw materials is crucial for ensuring the competitiveness and sustainable development of European industry. The fast-changing geopolitical and economic context affects the supply and demand of these materials."

The United Kingdom’s Federation of Fishermen’s Organisation agreed that "there are therefore geo-strategic reasons for retaining the possibility of undertaking deep sea mining."

Seascape consultants, who coordinate the EU’ MIDAS project on the environmental impact of deep-sea mining, suggested caution. They thought that terrestrial mining is probably sufficient to meet our needs in the near future. "We are looking into this aspect
and we have not completed our data gathering. However, our information to date does not suggest there is a significant need for these metals. The costs of deep-sea mining will not be competitive until metals become much more difficult to find on land. For example the demand for cobalt is less than 80,000 tons per year and many mines do not bother to extract it."

But the German Research Centre for Artificial Intelligence pointed out that terrestrial mining has environmental constraints too. "In Europe, access to new sites for the mining for higher value commodities and rare earth elements as well as a re-use of old sites is difficult due to strict environmental regulations and public perception of mining activities. If done with the right equipment in an ecologically sound way, non-invasive deep-sea mining can be a valid economic alternative."

1.12. Which deposits are of primary interest for you and where do you believe that most mining activity will take place?

![Figure 14 deposits of major interest to respondents](image)

There was no clear outcome when the respondents were asked which type of deposits would attract the most attention in the coming years. Sulphides, nodules and crusts were felt to have almost equal prospects. Similarly there was no clear opinion as to whether more activity would be based in jurisdictional or international waters.
1.13. What (if anything) is driving economic interest?

The two main factors driving the interest in deep-sea mining are advances in technology and limited access to raw materials from terrestrial resources. The respondents assigned almost the same relevance to each with technology emerging as slightly more significant.
Eurogeosurveys reported that interest from national governments was in securing reliable sources of raw materials for manufacturing industry.

IHC Merwede BV believe that it was not only limited access to terrestrial resources but also declining grades on land, increase in demand from a growing middle class and rising commodity prices that are driving economic interest in deep sea mining.

One respondent from Australia wrote that "there are no deposits on land that have nickel, copper and manganese all in the one deposit at the grades of seafloor polymetallic nodules. To produce the same amount of metal as you can from polymetallic nodules you would need to build 3 separate mines on land, e.g. a copper-molybdenum mine in the Andes, a nickel-vobalt mine in New Caledonia or Madagascar and a manganese mine in the Kalahari dextra, which involved 3 lots of infrastructure, 3 environmental and social disturbances. All these mines need be built in very remote locations with high costs and many people in remote construction camps versus a polymetallic 'mine' that is built in a ship yard and processing at a port. It is this factor that is driving the economics."

A respondent from Papua New Guinea thought that the Nautilus company was using their waters as a test-bred for technology that they could later apply elsewhere.

Technip, France, believe that technological developments in both the oil and gas industry and the metals and minerals industry were relevant and that bringing together companies from each area would be needed. The European Marine Board believed that technology developed for scientific exploration – remotely operated vehicles etc – could be used in mining and monitoring its environmental impact.

The Moana Nui Action Alliance pointed out that the provisions of the United Nations Convention on the Law of the Sea (UNCLOS) and the setting up the International Seabed Authority had also been instrumental.

Ocean Europe believe that "deposits will be found both in jurisdictional and international waters. The fact that the main driving interest is technological development is exactly the reason why the EU must regulate this activity. It is not simply because we possess the technology to mine the seabed or because it has now become economically feasible, that we should necessarily do it. It is major societal and political decision that EU citizens have a right, and duty to participate in."
1.14. What (if anything) is limiting the economic potential of this activity?

![Limits to economic potential](image)

**Figure 17 Limits to economic potential**

The limits to economic activity indicated by the respondents were rather different to those for shallow water activities. There the main reasons were opposition from local communities or other users of the sea. In international waters there are no local communities and even in jurisdictional waters the activities will generally be far from shore and create less disturbance to other activities although Seas at Risk thought that it could have an impact on communities in small islands.

In deeper waters, on the other hand, the main obstacles were access to finance, volatility of prices and technology limits. With uncertain current technological capabilities and uncertain future prices of raw materials it is difficult to attract investment. GEOMAR and the German Institute for Advanced Sustainability pointed to uncertain market conditions and cost of exploitation, coupled with the size, quality, and accessibility of the resources.

The UK National Oceanography Centre believe that knowledge of whereabouts and quality of resources must be a major barrier. Information on nodules, particularly in the Clarion Clipperton fracture zone, is relatively good but information on other resources is very patchy.

Eurogeosurveys believe that lack of a cost-effective and environmentally sustainable metallurgical processing technique for manganese nodules is holding back mining operations.

The European Marine Board thought that it was not only knowledge of deposits that is lacking, but also "our knowledge of the natural histories, life cycles, ecosystem interactions, and ecological functions of marine species and ecosystems. Still less is known about their resilience to human threats and natural pressures." The Surfrider Foundation of Europe and other civil society groups echoed these concerns. One researcher from France pointed out that we need to "explore the potential services these ecosystems and their associated biodiversity provide to humanity".
1.15. The environmental impact of deep-sea mining

![Figure 18 respondents' rating of environmental impact compared to other activities.](image)

Most researchers and most private companies believe that deep-sea mining is not intrinsically better or worse than other marine activities but it depends on how and where it is done. The civil society response was different. They do consider the impact to be worse. Again our uncertain knowledge of potential damage was given as a reason for caution.

For instance the Worldwide Fund for Nature pointed out that the value to humanity of vulnerable cold-water coral reefs, hydrothermal vent fields, seamount communities, coral gardens and deep sea fish stocks is still largely unknown.

Ocean Networks Canada were particularly worried by mining for nodules. They wrote that "Fishing activity is fairly limited in the low productivity deep-sea floor environments where much of the proposed mining would take place. Mining would therefore have a greater impact than fisheries. The scale of proposed polymetallic nodule mining is worrisome. There are no equivalents on land of mining operations covering thousands of square kilometres."

A respondent from the United States pointed out that each geographical area has its own characteristics. The impact of mining on deep-sea hydrothermal vent communities remains an open question. The Solwara mining group claims that vent communities in waters off Papua New Guinea will recover from mining disturbance within 5 to 10 years. The rationale behind this estimate is potentially flawed. It assumes that communities at western Pacific vents will recover similarly to those studied on the East Pacific Rise. Western Pacific communities, however, are quite different. (...) a community disturbed by mining at one vent may take much longer to recover than on the East Pacific Rise, where source populations are often just a few kilometres away."

IHC Merwede BV wrote that the impact may be lower than for terrestrial mining because "many deep sea deposits have very significant high grades and very low to non-existent stripping ratios. Therefore the amount of soil replacement, transport and processing may be considerably lower. However, it is very dependent of the methods used".
A respondent, writing in a personal capacity from France, thought that impact could be reduced considerably if reprocessing of sulphides, nodules and crusts were done on land.

### 1.16. What EU action would be helpful?

Figure 19

Because, as Seascape Consultants pointed out, "there are very few opportunities to mine in EU waters with the possible exception of the Azores ", the range of measures that the EU can take is limited. A group of French companies are looking at the possibilities in the exclusive economic zone of the French overseas territories Wallis and Futuna. DCNS, a French defence and energy company who aim to develop deep sea mining equipment and services also saw opportunities in French overseas territories but these are not directly subject to EU law.

Consistent with the finding that lack of understanding of environmental impact and technological capabilities are crucial bottlenecks, nearly all respondents indicated that the EU should support research in these areas. This could take the form of a pilot project Seascape Consultants said that "a test site might be useful for testing both equipment and environmental impacts e.g. plume generation and spread." DCNS also urged the launch of a pilot project. Eurogeosurveys and the UK's National Oceanography Centre pointed out the need to understand the baseline. The French Authorities consider that the EU could provide financial support to Member States that would help them and their industries to estimate the potential of the resources, improve knowledge of the neighbouring ecosystems, develop efficient technologies and increase knowledge of their impact.

In principle the companies prefer technology research to be left to the market but the Jan de Nul Group observed that "China, South-Korea, Japan and India have large government funded pilot test programs. It is not likely that any private company or consortium can match this without government support."

Researchers and private companies thought that the EU could help with seabed mapping

GEOMAR believe that "Guidelines for corporate responsibility are already well established by securities and exchange commissions. Guidelines for state-owned enterprises are less well defined. Reporting standards still need to be established, both in EEZs and in the Area."
The Sea First Foundation and Birdlife Europe both thought that, given the uncertainty involved, this was a prime case for applying the precautionary principle. Several of the civil society respondents, including those who replied through e-mail rather than the questionnaire, went further and thought that the EU should declare a moratorium. Most did not indicate how this would be done although Seas at Risk indicated that it should apply to EU waters and Sea First Foundation to EU-based companies.

Europêche noted that major areas have been closed to fishing for reasons of environmental protection and urged the European Commission to apply at least the same strict environmental standards to the mining industry’s exploration and extractive activities. Areas closed to fishing should also be closed to other activities such as oil and gas exploitation and seabed mining.

The Australian Deep Sea Mining Campaign supported creating a network of marine protected areas but not as a quid pro pro for allowing Deep Sea Mining Campaign to go ahead. The UKs National Federation of Fishermen’s Organisations pointed out that marine protected areas are only useful if they are enforced properly.