

## Draft Final report responses to comments: Task 6 Environmental Analysis

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RVB	the Marine Strategy Framework Directive (MSFD) may provide useful inputs, such as to the developing Regulations for the exploitation of polymetallic nodules	What about SMS then? Not sure if the term regulation should be used here – possible legal instruments	Corrected

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<b>Nigel Smith (DG ENVIRONMENT)</b>			
	8.2 Overview of environmental concerns	There had been a short section here in a previous draft which gave a headline overview of the main concerns. This is gone altogether, but we would like to see it reinstated and expanded. Essentially, we should be able to see in 1-2 pages: what are the main concerns, how serious are they (both in terms of destruction and in terms of time to recover) and broadly how do they differ across mine types.	Amended this chapter with overview
	The duration of a vent system can range from thousands to tens of thousands of years depending on the rate of spreading (for deposits on spreading ridges); efficiency of plumbing system (example in back arc settings) etc.	This is quite technical, could it be re-explained?	We have revised the text.
	The geographical extent of the physical disturbance from an individual mine is likely to be less than for comparable land operations. For example the Solwara 1 site in Papua New Guinea is only 0.112 km <sup>2</sup> .	Really? Why? Seems based on the Papua New Guinea example, but the industry is only getting going – who is to say larger-scale activity won't be pursued?  Compare this to the nodules point about mines of 300km <sup>2</sup> below...	We have amended the text. However, since the duration of mining at each site will be short (c 2-3 years) large numbers of sites may be targeted (depending on the size of the deposits) leading to similar sizes than land operations
	Although on first glance the abyssal plain areas of the ocean would appear largely unoccupied,	Really? Why do we say this? Especially if we contradict it in the next sentence	We have deleted the contradicting phrase.
	A single mine site may disturb about 300 km <sup>2</sup> of seabed area each year and there may be multiple operators mining at the same time at different sites.	How does this compare with the SMS comment that the mines will be smaller than land based mines. Can we explain why the different sizes for different types?	We have amended the text. Mining polymetallic nodules is expected to occur over very large areas of the abyssal sea floor because the ores are present in a very thin layer about 30 cm

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			thick on the seabed. This is in contrast to SMS deposits that are three-dimensional ore bodies extending some metres or tens of metres into the seabed. The CCZ itself covers approximately 4.5 million km <sup>2</sup> with an estimated 300 billion tonnes of nodules.
	Sub-surface, deep-water discharge of tailings : The report stresses the importance of good management and monitoring of tailings discharge in the context of the conservation and protection of marine life in the central Red Sea, adjacent coasts, and adjacent areas that are home to coral reefs (it should be noted that if mining were to proceed today there may not be any discharge of tailings into the water column	New sentence - could this be explained? Why not?	We have added the explanation of improved technology.
	<i>Knowledge gaps table: Biological</i>	Why is noise no longer here (was in earlier version)	It was removed after comments highlighting the fact that there are numerous studies on the impact of noise pollution
	<p>According to a recent UNEP report in principle, destruction of ecosystems associated with deep-sea minerals might involve the loss of 'existence values', or 'bequest values', or there may be future-use values of which we are currently unaware (also known as 'option values'). In practice, passive and option values (existence and bequest values) are likely to increase for three reasons:</p> <p>1)people will become more aware of these habitats, especially the specific habitats where mining is proposed;</p> <p>2)any future mining activity will decrease the number of available mining sites, and thereby potentially increase their value; and</p> <p>3)potential non-extractive uses of deep sea habitats including medicinal applications, bio-engineering, or even tourism may become relevant.</p> <p>Given that current passive and option values for these habitats are exceedingly small, as mining operations and associated research expands, these values are only likely to grow as we learn more</p>	<p>This section is still problematic for us (see previous comment below). (General) reference to UNEP Green growth in a blue world doc is now included, but would like to know more specifically what UNEP says and not necessarily go beyond it.</p> <p>The argumentation of this section is seriously problematic.</p> <p>If we understood this correctly, these are reasons why increased DSM will increase the bequest/existence/option values.</p> <p>Point 1), though strictly speaking true, is not an argument to be put forward – we should not need to threaten the very existence of a habitat in order to make people aware of it</p> <p>Point 2) is spurious – we cannot talk in the abstract about the potential increase in value of the (remaining) DSM sites until we have a proper understanding of the value of the original site (and what might be destroyed in the process of mining it)</p>	<p>We have reformulated the text. Point 1: Intent is to highlight the DSM means more exploration; more exploration means more awareness which leads to society making value judgments. Rare ecosystems (rare anything) tends to increase passive value as people treasure things that are rare or unique.</p> <p>Point 2: Again the reference is not use value but to passive/non-use value. If there is DSM, ecosystems currently considered rare, will become rarer still; this will increase their perceived value as ascribed by society.</p> <p>Point 3: when something is unknown, the world tends to apply the “precautionary approach”. This means that the absence of knowledge increases the passive value and potential-use values. DSM exploration efforts in parallel with other</p>

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	about these habitats. Consequently,	Point 3) is far-fetched. Blue biotechnology is a relatively new area, which is being explored with or without DSM activities taking place in parallel. There is not much concrete evidence of overlap between them and one shouldn't be used as a justification for the other. Also, the tourism gain is likely marginal at best.  Propose to delete or reformulate	exploration efforts will likely yield new knowledge that will inform as to new potential use for certain DSM targeted sites. This will increase calls to be cautious and thus lead to higher passive and potential-use values.
	9.1.1: Combined, these impacts reach organisms at the mine site and beyond	Text inserted: Although there is some understanding about their individual effect, very little is known about the cumulative effect that these impacts have on the marine environment.	Accepted the insertion.
	They may be the inadvertent introduction of invasive species	Invasive species is listed here, but never included in the tables below – what are the risks associated with invasive species?	Invasive species is not specific to DSM activities. We have removed.
	leaving a noticeable impact on that local population	Descriptor 3 (fish populations) are never listed in the tables – should they be?	DSM is not likely to affect fish stocks linked to fisheries
	<i>Table 9.1</i>	Inserted text for potential impacted area for noise: The sound characteristics of deep sea mining have yet to be established. It is likely to be similar to shallow water dredging in terms of frequencies emitted (generally low frequency, but with some high frequency components). The amplitude is unknown. The area impacted is generally a product of frequency and amplitude, so cannot be determined at present.	We have amended the text
	<i>Table 9.1</i>	Marine litter: Is this litter? The general litter definition includes that it is manmade, so if the tailings are only made up of natural material, we could delete this.	Deleted the marine litter as it is not relevant
	<i>Table 9.1</i>	Text inserted for Potential for recovery for noise: Impacts on species are not known. While short term masking can occur for individuals within the area affected, no long-term consequences, nor effects at the population level from masking have been found	We have amended the text
	<i>Table 9.1: SMS and crusts</i>	In Nodules there is an entry on Potential loss of ship or pollution from ships - should this not be here also? Is there no ship in SMS mining?	Inserted the row on pollution from ships

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		Could add a table here on comparison with recycling	Added a table in the recycling chapter
	A decreasing supply of high-quality ores also drives mining operators towards more “remote and challenging environments” such as the seabed which is likely to have certain environmental and social impacts	Still not clear on what the social impacts are...	We have added clarification
	It has been proposed by industry that the ecological footprint of a deep sea mine in comparison to an equivalent land-based operation would be considerably smaller. However, at present, there is insufficient information to substantiate this claim.	This is admitted to be an unsubstantiated claim, so it should not be repeated.	We have deleted the text and revised the follow- up paragraph.
	However despite whether marine mining has a higher or lower footprint than land based mining, a country or region’s total ecological footprint (with respect to activities of “land” transformation”) is cumulative and cannot be separated activity by activity. So whether the mining activity affects the forest biome or the ocean biome, it affects the biocapacity of the country and region as a whole due to the interconnected nature of ecosystems.	Still don't see the relevance of this point - it implies that DSM is an alternative to land-based mining (shifting from one bit of the biome to another), but it may take place in addition to it, increasing the footprint	GRID
	<i>Table 9.5 SMS Land disturbance: Limited spatial extent of physical disturbance</i>	If this is the case, should explain why either in the table or in the narrative above.	Added explanation
	Table 9.5 waste generation	As above, should explain the difference in amount of tailings – why?	Added explanation
	Table 9.5 biodiversity: Rehabilitation possible	Need to be more precise here (and in the marine column) - to what extend and over what time frame is rehabilitation possible?	explained in the next row at rehabilitation potential
	Table 9.5 Rehabilitation potential: limited spatial scale	Again, why?	explained in the next row at rehabilitation potential
	9.4 Comparison with recycling	This section should be reframed in light of discussions with DG ENTR – we cannot in a page or two give a complete overview the environmental impacts, but it should clearly outline what we do and don't know in our ability to compare. A side-by-side comparison table, like for land-based mining above would be	Amended the text with table

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		useful.	
		GHG emissions as a key comparison	Amended the text
	Mixed metal alloys	You mean energy used as a comparison with recycling of something more pure presumably? But how does this compare to the energy used to dig it out of the deep-sea?	Corrected the text
	Consequently the sequence of activities proposed below are a translation of the relevant environmental, social values, high level	The relationship between the text and graphic are still not clear for me...	Removed the graph