

Attuning to the deep

On the opportunities of thinking with art for an ethics of the deep sea.

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This paper is has been submitted to a journal and is currently under consideration for publication

Abstract

Seabed mining, the extraction of minerals from the deep-sea floor, is hotly contested. Policymakers have agreed on the need for a regulatory framework. However, traditional ethical theories and principles are not well equipped for the ethics of the alien deep sea. Engaging with the sea means engaging with something abstract that we can only access indirectly. We argue that this invisibility and alienness of the sea and its inhabitants can give new insights into how ethics are done. Rather than getting even more grip on what is already directly known, considering what is outside our usual moral view may be just as valuable. To do so, art can help us think with these unknown and invisible parts of the ecosystem. For that, we describe three cases. The scientist and artist Eugen Ransonnet engaged with the underwater world in the late 19th century. The Victorian flower painter Marianne North's unruly approach greatly influenced the botanic discourse until today. And finally, Christina Stadlbauer's Institute for the Relocation of Biodiversity and her work with the mollusk *Pinna Nobilis* in Mar Menor, Spain. We describe the *Pinna Nobilis* video project and the ethical and political opportunities it opens. We propose that engaging with the arts can pave the way towards including the unknown in ethical reflection and, at the same time, how it can rephrase questions that can help us reconsider what is outside of our moral view.

Keywords

Deep sea mining, research-creation, attunement, bioethics

Introduction

Seabed mining, the extraction of minerals from the deep-sea floor, is hotly contested. Most of the seabed is part of the so-called *area*, which falls outside of any national jurisdiction and is considered a common heritage of humanity. For a long time, it has also been considered a kind of barren place reminiscent of the surface of the moon. Like the moon, it is a somewhat void place that does not call for safeguarding. However, in the last decades, progressive insights into the interrelatedness of different ecosystems on Earth and increasing discoveries of life in the deep sea have given rise to a call for protection. However, people are divided with respect to the form this protection should take. Some argue that it should take the form of at least a regulatory framework. Others state that a moratorium on seabed mining is called for to protect the marine environment from the potentially harmful effects of deep-sea exploitationⁱ.

The legal framework surrounding the seas and oceans is divided into distinct maritime zones, each with its jurisdiction and implications. The area is regulated by the legal system of The United Nations Convention on the Law of the Sea (UNCLOS). It established the *International Seabed Authority (ISA)* to regulate and manage activities related to deep seabed mining. The ISA issues 'The Mining Code': a set of rules, regulations and procedures to regulate prospecting, exploration and exploitation of marine minerals in the international seabed Area or "the Area" (defined as the seabed and ocean floor and subsoil thereof beyond the limits of national jurisdiction). The part that addresses the 'Exploitation regulations' needs to be adopted by the ISA Council before any contract for mineral exploitation can be issued. Every mining project needs the sponsorship of a responsible "sponsoring state". Alongside the ISA, that state is responsible for enforcing the requirements while the project is being carried outⁱⁱ.

Despite this legal uncertainty, mining operations are being prepared as we speak. Mining corporations are exploring the deep sea with the help of scientists. 31 state-sponsored expeditions are mapping the seabed and investigating the presence of high concentrations of polymetallic nodules, polymetallic sulphides, and cobalt-rich ferromanganese. This part of the body of scientific work focuses on impacts on seafloor environments, paying little attention to pelagic ecosystems. On the other hand, some scientists take a relational ecosystem approach, pointing to the effects of mining beyond the mere mining sites (Christiansen and Bräger 2023; Drazen et al. 2020). Such research demonstrates that mining the seafloor would result in sediment plumes and noise at the seabed and water column. Hence, this results in considerable ecological impacts in deep midwaters that can stretch from around 200 metres to 5 kilometres and noise impacting over 1000s of kilometres. Deep midwater ecosystems constitute over 90% of the biosphere, link shallow and deep-sea ecosystems, and play vital roles in carbon transport and nutrition. These studies detail how these risks can be more meticulously assessed to facilitate decision-making by environmental resource managers and broader society on whether and how deep-sea mining should proceed. However, none of the mentioned

Drawing a regulatory framework means accounting for different aspects, from legal aspects to scientific knowledge, to considering the needs and wishes of all stakeholders involved. However, such a regulatory framework should not only weigh environmental concerns, scientific facts and (human) stakeholder interests. For example, we should ask ourselves why the stakeholders should be limited to human beings or how deep-sea mining will affect them. None of the articles mentioned above discusses whether humans are entitled to remove these multimetallic entities that have evolved over millions of years from the Earth's crust. Are they beyond the realm of ethical and legal concerns? A legal framework

should also be based on solid ethical foundations. However, this is easier said than done. Given the seabed's specific characteristics and alienness, a suitable framework is not straightforward, and traditional principles and moral theories from applied ethics may not suffice. For example, the four principles of biomedical ethics, autonomy, beneficence, non-maleficence and justice, as they were laid down in Tom Beauchamp and James Childress's seminal book, are currently deployed in areas beyond medical ethics, such as ethics of AI or ethics of synthetic biology (Beauchamp and Childress 2019). However, they seem ill-equipped to deal with areas containing creatures and minerals we do not know yet and may not know because they have gone extinct due to human interference already.

Indeed, up to now, the deep sea has received relatively little attention in ethics and philosophy. In recent decades, there has been a growing interest in different fields of humanities and social sciences for the sea and the relationship of human beings with the sea (Campbell and Paye 2020). *Blue humanities* is an interdisciplinary field that unites scholars from literature, history, geography and anthropology to study the sea. It often engages with feminist posthumanities and is inspired by theoretical concepts from feminist Science and Technology Studies (STS). Marietta Radomska and Cecilia Åsberg describe Blue Humanities as involving "a turn to the political ontologies of the sea, their implications for multispecies temporalities and aesthetics, human communities, and more-than-human ethics in the Anthropocene" (Radomska and Åsberg 2022). Although ethicists have comparatively little reflected on marine duties and responsibilities, blue humanities scholars have pointed out the ethical importance of our entanglement with the sea. For example, Radomska and Åsberg advocate for a *low-trophic theory*, 'a situated ethical stance that attends to entanglements of consumption, food, violence, environmental adaptability and more-than-human care from the co-existential perspective of multispecies ethics.' (Radomska and Åsberg 2022). They point out that such low-trophic theory implies an engagement with the arts to imagine possible futures, as the theory is 'a practice of thinking and theorizing that requires creativity and imagination; that takes more-than-human hospitality and responsibility seriously'. We are sympathetic to this argument and follow a similar line of thought in this article. We also believe that ethics can evolve through engaging with the arts for an ethical framework for the deep sea. However, we will also engage with the deep sea's fundamental alienness and questions of care and entanglement with what escapes our imagination or circles of concern. Indeed, the anthropologist Stefan Helmreich reflects, in his seminal work *Alien Ocean*, on the alienness of the sea when studying marine biologists working in the microscopic world, the deep sea, and oceans outside national sovereignty - realms usually out of sight and reach (Helmreich 2009).

We proceed as follows. First, we argue that dominant ethical theories and principles are not well equipped for an ethic of the alien deep sea. Maybe the deep seabed should be reconceptualized as not-so-alien, part and parcel of our intrinsically linked global ecosystem. We argue that drawing the deep sea and its creatures into existing ethical frameworks to make them relevant only partially does justice to their specificity and that the ethics of the deep sea should also engage with what it means for something to be strange and unknown.

We continue by exploring the possibility of an *ethics of attunement* that deals with what cannot be wholly known or what isn't known yet in scientific terms. The arts, just like any discipline, cannot be expected to have solutions to the ethical conundrum. However, in what risks to be a paralysis of hopelessness and despair it can create imaginaries that can point to alternative ways of thinking. The alternative ways of thinking, in turn, allow for the creation of narratives that help with a new understanding of how to be in the world and think with worlds that we risk losing even before we fully

acknowledge their existence. Using the examples of sound and the ethics surrounding marine sound pollution, we suggest that an intimate collaboration of arts and ethics can point the way to different ways of knowing and doing.

Ethics and the sea

We can identify many issues requiring ethical reflection concerning the topic of 'ethics and the sea'. Such issues include the moral status of marine animals, the impact of human activities on marine ecosystems, the distribution and allocation of marine resources and services, the rights and duties of stakeholders such as fishermen, scientists, policymakers and coastal dwellers and the impact of colonization. Indeed, environmental ethicists and bioethicists have thought about rights, duties and responsibilities with respect to the marine environment. For example, in the 2003 edited volume *Values at Sea, Ethics for the Marine Environment*, the editor Dorinda G. Dallmeyer gathered 14 chapters dealing with diverse topics such as oil spill prevention, public involvement, fisheries and the (mis) use of traditional ecological knowledge (Dallmeyer 2003). Several contributors start from the idea that human beings are somehow connected with the marine environment, and, hence, there is a need to protect the marine environment for reasons that transcend its immediate usefulness for human beings. For example, in the first chapter of the volume, Stephen R. Kellert advocates for an 'enlightened self-interest' approach: "The environmental and marine ethics advanced here expands the concept of self-interest far beyond the narrow confines of material and economic benefit. Instead, we advocate a notion of utility rooted in the human dependence on nature and the marine world not just for bodily comfort and physical health but also for creative capacity, intellectual prowess, emotional relations, spiritual connections and more." (Kellert 2003) They identify several values that can guide such an approach to marine ethics, including utilitarian, scientific and aesthetic values (Auster et al. 2009). In the second chapter, Clark Wolf argues for sea ethics, in line with Aldo Leopold's "Land Ethic" and the "key log" principle, which states that "a thing is right when it tends to preserve the integrity, stability and beauty of the biotic community. It is wrong when it tends otherwise." The chapter ends with the statement that environmental ethics "has branched in many productive directions" and continues by explicitly mentioning feminist contributions (Wolf 2003). Indeed, in the twenty years since the publication of the volume, feminist posthuman thinkers have elaborated relational and flat ontologies and removed the human from its pedestal. If reality must be conceived of as an intricate web of entanglements and humans as knots in relational webs, this has implications for how we conceive ethics. Rather than seeing ethics as applying top-down principles, an ethics that centres care and maintains this relational web seems adequate. We ourselves feel at home with such an approach to ethics. However, when thinking about our ethical responsibilities towards the nodules and creatures living in the deep sea, we also bumped up against the limits of approaches that presuppose the existence of a relationality between the different actors. Besides an ethic of relationality, we believe there is much to be gained to include an ethic of the unknown. However, conceptualizing such ethics is not straightforward.

Indeed, existing ways of thinking about rights, duties and responsibilities concerning the sea require some level of familiarity with the things or organisms under consideration. This requirement is most apparent when taking a cost-benefit analysis approach, as is usual in utilitarian calculus. For example, when discussing the rights and duties of fishermen and their catch, we can start by considering each party's relative interests. Being able to consider different interests at least does not mean this ethical

balancing act will yield straightforward answers. After all, how much value we attribute to fish, a person, or even a consumer is highly dependent on contexts and cultural frameworks. But at least it is possible to make explicit the framework we are using and the existing interests we are considering. Such an act of making explicit is hardly possible for the vast stretches of the deep sea that are yet unknown and the creatures that live there. It is almost impossible to perform a utilitarian calculus. After all, we do not know what we will weigh against what. What is worse, when balancing the interests of what we know with the interests of the unknown, it is tempting to make the former more serious and even assume that it is precisely because we know them and are familiar with them that they need to be considered first. For example, it may be so that plans to mine the nodules on the deep-sea floor are at least partially inspired by the genuine need to find an alternative to current unethical mineral mining practices that seriously impact the health and wellbeing of miners and the ecosystem alike. Consider also, for example, the all too familiar images of the deforestation of the Amazonian rainforest. No similar iconic photos exist for the ocean floor. This also means there is a sense of urgency regarding the rainforest that is not yet there (yet) for the deep sea.

Perhaps another moral theory, that of intrinsic values and deontology, can shed some fresh light on the issue at hand. We could argue that deep sea creatures, and even deep-sea nodules, have inalienable and intrinsic value. There are at least two ways in which intrinsic values have been attributed to more-than-human entities. Extending Kantian deontology, Tom Regan has famously argued that more-than-human entities are 'subjects of a life' (Regan 2004). Hence, their individual lives have intrinsic value. Other philosophers take a more ecocentric approach and argue that the ecosystem as a whole has intrinsic value (Rogers 2000). But in both cases, the inherent value hinges on at least some level of knowledge about either individual creatures or the function of ecosystems.

Can we start from the assumption that we find 'subjects of a life', whatever that means, at the bottom of the deep ocean? Who counts as a subject of a life, given that it is unclear what kind of life will be disturbed? What are the criteria for being a subject of a life or for having intrinsic value? Do colonies of microbes or even viruses that we may not know yet and that are dependent on the nodules even count in this view? Do the nodules themselves have intrinsic value, although they probably would not fit the definition of Regan's 'subject of a life'? It may be more fruitful to start from the assumption that the seabed is intrinsically linked to the entire ecosystem and, in that respect, has intrinsic value. Considering ecosystems instead of individual species can paint a more complete picture. For example, Emily Boring reminds us that in the ocean, more than anywhere, all is connected – via sound, currents, and water. Hence, the wellbeing of one species depends on the rest of the system in ways we can't predict or foresee. Taking the example of the damselfish, a reef species, she explains that marine management must consider the ecosystem as a whole. However, it is not always obvious where this ecosystem begins and ends, how it behaves, or how it will change (Boring 2019). Not all of the system is known or will ever be – nonetheless, we agree that thinking about the ocean is only meaningful when considering the entirety.

Starting from a relational approach, recent posthuman approaches in care ethics are more fruitful when considering the ethics of the deep sea. For example, Maria Puig Dela Bellacasa has argued for a care ethics approach based on the ideas of Joan Tronto that includes more-than-human entities in a web of care (Puig de la Bellacasa 2017). Similarly, what happens at the bottom of the sea may well be part of such a web of care and should be equally included in our own. However promising, even such an approach cannot completely dissolve all the challenges concerning how to conceive of an ethics of the

unknown. One possible way out would be to include the whole Earth (GAIA) as one extensive ecosystem with intrinsic value, with all that we know and all that we do not know. After all, the oceans are no longer merely dangerous border places irrelevant to what happens on land. For quite some time now, the role of oceans in temperature regulation and climate change has been known (Hilmi et al. 2023). Vice versa, it has become clear that global warming also affects the deep-sea (Messias and Mercier 2022). We are sympathetic to the relational approach that starts from the idea that everything on Earth is intrinsically connected. This will align with some of the suggestions we make below. At the same time, the challenges do not end here. Do we only include life in the strict sense? As a thought experiment, let us imagine there are stretches of isolated ocean beds with no life form, and neither do they influence the larger ecosystem. Are they outside of the boundaries of moral consideration? If we cast our net very widely, does it include the Earth's atmosphere? After all, there is a limit to what is included in ethical considerations. We do not, for example, include what happens in far-off galaxies in our ethical considerations unless it directly impacts us. But even GAIA, as conceived by James Lovelock and Lynn Margulis is not a closed system but influenced by events in outer space. Maybe it means including the entire universe as having intrinsic value. If so, perhaps it is also wrong to use uninhabited other planets as mining resources or dumps for radioactive waste.

Intuitively, many people will probably agree that even those deep-sea beds, the lives that live there, and the nodules that have grown there are entitled to at least some protection. But most discussions about why this is so and how we balance it against other interests still start from the assumption that they are somehow related to us and may even serve us somehow. We may argue that the deep-sea needs protection because of its potential utility to humans or the ecosystem. For example, extremophiles living around thermal vents may hold the secrets for certain medicines or form the basis of new technologies (Zeng et al. 2021).



Screenshot from <https://spectrum.ieee.org/the-seabed-solution>

Zorpette, G 2022, 'After 150 years, is the time finally right for deep-ocean mining?'

IEEE Spectrum, IEEE Media, <<https://www.seabed-solutions.com/machines-for-deep-sea-mining/>

And while admiring the strange hitherto unknown creatures, seabed exploration has discovered, one cannot but consider their intrinsic value. However, there is something paradoxical in these sentiments, and they reveal two additional problems. The first one has to do with the value of knowledge itself. Many people would contend that the advancement of science is an intrinsic value. Many of us have marveled at the discovery of yet another weird and wonderful deep-sea creature. It is an uncomfortable

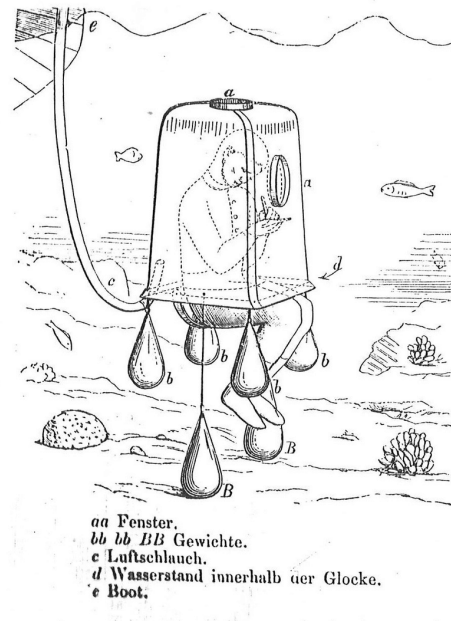
truth that it is precisely through seabed mining explorations that many of these new species have been discovered. For example, in May 2023, the Guardian wrote that more than 5000 new species were found in the Clarion-Clipperton zone, an area of the Pacific Ocean between Hawaii and Mexico where mineral firms are scouting for exploitation (McVeigh 2023). However, it is ironic that the technologies that have enabled scientists to discover organisms are now considered to need protection from these technologies. Moreover, many creatures may have already disappeared because of human influence (O'Hara et al. 2021). Instead of assuming that we need to know and study something for it to become worthy of ethical consideration, maybe the time is there to consider the idea that precisely such an attitude does not leave much room for ethics of what is unknown and will never be known. Similarly, it has been argued that it is vital to map the seabed to make it visible as an area worthy of protection (Carey 2021). However, mapping the ocean bed probably makes it equally and perhaps more susceptible to protection than exploitation. Indeed, making areas and creatures less alien comes with a cost (Tănăsescu 2022). Drawing them into the sphere of the familiar means drawing them into the sphere of what can be manipulated and used. We are reminiscent of the high mountains, which have been considered almost forbidden terrain for centuries and have now become sometimes deadly playgrounds (Macfarlane 2008).

So, here is the conundrum. Thinking about the ethics of deep-sea mining means thinking with the unknown, the alien. This means reflecting on how to make ethical judgements in the light of what is still speculative. But it also means that existing ethical frameworks should be extended with an ethics of the unknown, which means engaging with the idea that some areas, things and creatures that have been unknown until now should perhaps stay unknown. Or at least that we reflect on the conditions of possibility that make an ethical engagement with the unknown possible. It is here that traditional ethics reaches its limits. In the next section, we will investigate how engaging with the arts may pave the way towards including the unknown in ethical reflection and, at the same time, how it can rephrase questions that can help us reconsider what is outside of our moral view, and also suggest ways of doing science that do not rely on extractivism.

Towards an art and ethics of deep-sea attunement

To investigate the opportunities an engagement with the arts can offer for an ethics of the unknown, we will first start with some historical examples. The artists/scientists mentioned in the following paragraphs were proposing alternatives for dominant thinking in their time. However, as they were not entirely accepted or fully taken seriously, their work also has a political dimension. The diplomat, painter and biologist *Eugen van Ransonnet* (1838-1926) is known for his underwater paintings and sketches. He made significant contributions to marine science and art, and his work has been influential in developing oceanography and understanding underwater landscapes (Jovanovic-Kruspel et al. 2017). His work is remarkable because he intended to be as realistic as possible. To this end, he developed a way to sketch by simply observing the existing situation underwater instead of collecting samples and bringing them ashore while ripping them out of their ecosystem. He worked in a diving bell that allowed him to observe the underwater world and take sketches on the spot. His works depict entire ecosystems in the autochthonal landscape.

Eugen von Ransonnet: the diving bell, illustration from: Ceylon. Skizzen seiner Bewohner, seines Thier- und Pflanzenlebens und Untersuchungen des Meeresgrundes nahe der Küste, Braunschweig, 1868; libraries, NHM Vienna.



The second example is *Marianne North* (1830 –1890), an artist and biologist known for her global and site-specific plant portraits. Criticized for a lack of objectivity and scientific knowledge in her work – Marianne North's plant portraiture is characterized as a kaleidoscope of the world, depicting the entanglements of landscape, plant, animal, and weather. She shows the plant in an affectively charged, multisensory partnership with insects, humans, etc. She shows plants signalling and conducting interspecies communication (Carroll 2018). As such, her art exemplifies what Carla Hustak and Natasha Myers call 'affective entanglement' (Hustak and Myers 2012). Instead of depicting the specimen in isolation, she painted the flowers in an integrated context of their native ecosystems. This created a clear connection between her work and the themes of adaptation and conflict discussed by Darwin – who knew her and admired her work.

Embedded in North's plant paintings are biographical and historical sources that link her art to the beginning of evolutionary theories, which came into being simultaneously (Kerrigan 2010). Marianne North has made a crucial contribution to, and intervention within, the field of botanical conflicts and discourses that inform the field to this day. As such, North and van Ransonnet can inspire a kind of science that does not rely on extractivism and may enjoy deep sea creatures in their habitat. There is no diving bell with which we can explore the alien landscapes of the deep sea. We may wonder if it is even possible to know the area without some level of extractivism. Rather than studying and observing, the relationship we may establish may be one of communicating or even playful attuning. For that, we turn to the challenges and possibilities of sound.

Although sound may not be the first sense we think of when considering the ocean, the ocean is full of low-frequency sounds produced by natural phenomena such as rain, waves and marine life. Human activities such as sonar systems and ships also produce sound and use the ocean's transmitting capacities. For example, SOFAR (SOund Fixing And Ranging transmission) is an ocean channel that allows the flow of low-frequency sound waves to travel long distances by bouncing between layers of water with different temperatures and salinities. It was first used for surveillance in the Second World War and

is still used today (Goodman 2009). Moreover, it has been argued that human-made sound will increasingly penetrate the depths of seas and oceans because the concentration of chemicals that absorb low-frequency sound depends on the pH of the ocean (Ilyina et al. 2010). Sound is also monitored to assess the impact of human-originated sound on the marine environment. The European Marine Strategy Network names noise as one of 11 descriptors to determine the environmental status of the ocean, with the hope of providing industry with an environmentally responsible approach (André 2018). It is to be expected that noise originating from mining activities in the deep sea will also affect species that live in the deep sea. Rob Williams and colleagues describe how effects could be cumulative when multiple mines operate, and sound from the mines can impact areas that are not mined but designated as 'preservation reference areas' (Williams et al. 2022). Moreover, as the Clarion Clipperton Zone is a habitat for cetaceans, the noise from the planned mining activities could directly affect them. As Kirsten Thompson and colleagues write: "If permitted, commercial-scale mining is expected to operate 24 hours a day, at varying depths. The sounds produced from mining operations, including from remotely operated vehicles on the seafloor, overlap with the frequencies at which cetaceans communicate, which can cause auditory masking and behavior change in marine mammals. Cetaceans are already facing numerous stressors, including climate change, and many species are still recovering from centuries of exploitation." (Thompson et al. 2023).

The thought of the vast oceans being under constant siege of anthropogenic sounds and the plight of the animals and other creatures whose own communication systems are deeply influenced by these sounds is overwhelming. It may even leave us with a sense of horror. Perhaps we need to bend the narrative and reimagine sound to attune to the vast unknown, the deep sea. Besides being considered an intrusion, sound can be a way to practice the art of multispecies attentiveness, such as attentively responding to the global signaling of cetaceans and marine vertebrates (Program 2000). Perhaps sound can also be a way to attune to creatures whose lives are unfamiliar, such as those of invertebrates and especially those living in the deep-sea bed.

Deep Sea Excavator
Image from company
website, Mitsui Miike
Machinery Co. Ltd.,
download 10 Dec. 2023



One example of an artistic intervention that comments on sound underwater and the capacity of sea life to "hear" is the Video Tutorial "Relocation training for *Pinna nobilis*" - a work around the Great Pen shell in the Mediterranean

Sea (Stadlbauer and Bartaku 2020). In the research facility Acuario de Murcia (Spain), the scientists noticed that the shell living in the aquarium reacted to deep base sounds of a nearby techno party and closed the shell halves. When taking the scientists' findings seriously, we understand that the capacity of the mollusks to "hear" can only mean that sound is a signal that the animal can read. Inspired by these findings, gentle percussion sounds were used in the video tutorial to address the animal (Coghlan 2017). The pen shell being the primary audience, the video tutorial was shown to a colony of molluscs as an underwater screening in the Mar Menor in Spain. Some human spectators were also admitted. Equipped with snorkel masks, they were seated on chairs close to the shells to watch the underwater video. Local politicians and stakeholders were invited to the public performance and underwater screening of the tutorial for mollusks. Despite their confirmation of attendance, none of them showed up. Instead, a journalist-activist participated and was inspired by the event for an in-depth article. Although the performance had a very limited number of attendees, the event itself can be called political. The work intended to signal to a mollusk just as much as towards humankind. Indeed, as in the case of Mar Menor, the governing stakeholders of deep-sea mining have embarked on a journey that takes economic rules as immutable given, whereas the abundance of resources is understood as negotiable. Obviously, the opposite must be the precept. Are economic values so countable, measurable and highly relevant that they overrule any proposal putting "wellbeing" forward? As long as we continue to agree to perpetuate the understanding of the growth model as invariant, we will continue to pretend to need endless resources that are available to be exploited. For progress, we merely have to overcome technical difficulties. Therefore, we also need artists who rethink ecology in economic terms. By finding ways to playfully engage with and attune to the unknown, arts can open up different ways of seeing and pave the way for ethics that can influence decisions to benefit all life forms. Similarly, the works of Eugen van Ransonnet and Marianne North also comment on what is accepted as being scientific by proposing a different path. Maybe artists, not scientists or ethicists, are daring enough to challenge the dominant system and point towards alternatives.

Conclusion

When preparing the article, we, two Bioartists and one ethicist, dived deep into the current and prospected practices of deep-sea exploitation and the characteristics of both individual species and ecosystems of the sea. The intense engagement with these topics affected us emotionally beyond what we expected and made the effort to stay objective, analytical and sober challenging. The result was a period of intellectual paralysis paired with anger and despair. The deep sea is exemplary of Timothy Morton's idea of a hyperobject, something that challenges conventional notions of causality, temporality, and spatiality, that reveal the interconnection and interdependence of all beings, without at the same time painting a rosy picture of what such interconnection might entail. Instead, Morton advocates for Dark Ecology, an approach that acknowledges the paradoxes of the current ecological crisis (Morton 2018). Rather than advocating for a 'back to nature' approach, such dark ecology entails accepting that we cannot fully grasp the vastness and even the horror of the situation at hand. Still, and maybe because of that, we must coexist with more-than-human entities in a non-exploitative way.

In fact, translating this into applied ethics that can inform regulatory frameworks is easier said than done. However, art can help us imagine what this may mean by playfully engaging with the unknown. Such art will often be unsettling. Indeed, the world is increasingly unthinkable, a world of planetary disasters, emerging pandemics, and the looming threat of extinction. Eugene Thacker's *In the Dust of*

This Planet suggests that we look to horror as a way of thinking about the unthinkable world (Thacker and Thacker 2011). To confront this idea is to face the limit of our ability to understand the world in which we live – a central motif of the horror genre. We have suggested sound as a promising concept to think with. Both a means of intrusion and connection, artists can experiment with sound to attune to the deep sea. Such attunement does not have as a primary goal to make the unknown knowable completely. Instead, it may offer opportunities to establish relationships with what is unknown and appreciate the unknown for what it is. The attentive reader may remark that we are far removed from concrete suggestions as to how the seabed could be mined ethically or on which basis an ethical regulatory framework can be devised. Intuitively, we agree that the deep-sea nodules should not be mined. But we acknowledge that a moratorium is unlikely. Perhaps there is a principle from applied ethics that should be deployed, that of precaution.

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ⁱ For a list of actors opposing seabed mining, please see: Dees Sea Conservation Coalition - https://savethehighseas.org/moratorium_2022/

ⁱⁱ The Mining Code can be found here: [The Mining Code - International Seabed Authority \(isa.org.jm\)](https://www.isa.org.jm/the-mining-code)