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From organizations as systems of ocean destruction to organizations as systems of ocean thriving

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Abstract

Despite growing awareness around human impacts on marine ecosystems, little action is taken to reduce the negative effects of organizations on the ocean, thus increasing risks of global collapse. In this paper, I argue that organizations act as systems of ocean destruction, and I explore how to operate a shift to organizations as systems of ocean conservation and thriving, enabling human–ocean socio-ecological coviability. To do so, I analyze the organizational affordances of the ocean: incommensurability, open access and complex property regimes, structural domination by humans and land, perceived inexhaustibility and cognitive distance. Then, based on the transdisciplinary analysis of mechanisms of ocean destruction, I discuss the constitution of ocean negative commons and the zombification process of the ocean. Lastly, I suggest alternative organizing principles that would allow to manage these commons and transform organizations to reconnect them with the ocean: degrowth, total responsibility, full cost allocation, ocean equity, and adaptive, place-based co-management.

Keywords: sustainable ocean, eco-centric approach, ocean negative commons, ocean equity

Introduction

The IPCC (2019) special report on oceans raises the alarm on the gravity of threats to marine ecosystems caused by organizations. The climate crisis, abusive and unsustainable exploitation of marine resources, and wide-reaching habitat destruction resulting from human activities are threatening the ocean and the cryosphere in an unprecedented way (Costanza, 1999; Pörtner et al., 2019; Wright et al., 2018). According to the UNESCO¹, there are almost 500 dead zones in the oceans, places where life has literally become impossible, which together span more than 245000 km² of ocean. About 35% of key marine habitats like mangrove, kelp forest or coral reefs that provide crucial ecosystem services to humanity have disappeared between 1980 and 2005.

Despite its importance for human life and the grand challenges it faces, the ocean has so far been a blind spot in Management and Organization Studies (MOS), even in eco-centric critical approaches. We are therefore failing to holistically understand the impacts of organizations, in particular global and most exploitative ones like States and multinational companies in industrialized, global systems of production and consumption, on the ocean, and how to address them. This blind spot is likely to perpetuate an ocean exploitation paradigm both in academia and public decision-making (Sandhu, 2010). This in turn aggravates risks of global collapse. ‘Blue growth’ and other national or transnational ‘blue economy’ strategies are now starting to emerge as key pillars of economic development (Eikeset et al., 2018). These schemes could counterproductively put further pressure on marine ecosystems if they are not grounded in socio-ecological ‘coviability’, that is to say, avoiding global collapse by ensuring a harmonious, interdependent, sustainable evolution of both the human and nonhuman (Barrière et al., 2019).

With that vision, and in line with critical approaches of organizations, this paper investigates how to operate a shift from organizations as systems of destruction of the ocean, to organizations as systems of ocean conservation and thriving. To do so, I take inspiration from ecological thinking, including approaches like collapsology (Servigne & Stevens, 2015), coviability (Barrière et al., 2019) and ecological philosophy (Bonnet et al., 2021; Charbonnier, 2020). I use collapsology as a transdisciplinary approach that seeks to combine findings from different disciplines in earth, life and social sciences (Servigne & Stevens, 2020). Such a perspective underlines that scientific assessments on crises in the natural and social environment are much more serious when taken together than when taken separately. The coviability approach seeks to reintegrate humans into the biosphere and thus also invites to transdisciplinary thinking (Barrière et al., 2019). Lastly, ecological philosophy offers fruitful concepts to understand the detrimental effects of organizations on nature and the living.

This paper contributes to management and organization studies, first by shedding a much-needed light on organizations as systems of ocean destruction, then by providing a theoretical framework to understand how to shift to organizations as systems of ocean conservation and human-ocean coviability.

The paper is organized as follows. I first analyze the significance of the ocean for organization studies and the organizational affordances of the ocean, that is to say its actionable characteristics that affect organizations’ actions and in return their impacts on the ocean. I then review transdisciplinary evidence of organizations as systems of ocean destruction. In so doing, I argue that organizations produce ocean negative commons, defined as visible or invisible, material or immaterial organizational outputs

¹ <http://www.unesco.org/new/en/natural-sciences/ioc-oceans/focus-areas/rio-20-ocean/blueprint-for-the-future-we-want/marine-pollution/>

or externalities that possess a negative value because they are detrimental to the appropriate functioning and beauty of marine ecosystems and marine life. Organizations therefore contribute to a process of ocean zombification – of systematic transformation of ocean life into ruins. Finally, working up from these foundations, I put forward a framework to transform organizations into systems of ocean conservation and thriving, enabling coviability. This framework articulates principles of degrowth, total responsibility over the value chain, full cost allocation to ensure ocean equity, and adaptive, place-based co-management. In the last section, I discuss the implications of this work, the limits of this analysis and future research.

The significance of the ocean for organizations

‘Organizations are the primary instrument by which humans impact their natural environment’ (Shrivastava, 1994: 707). Eco-centric views in MOS argue that organizations result in the destruction of the natural environment (Banerjee, 2003; Ergene et al., 2020; Sandhu, 2010; Shrivastava, 1994). Yet, most dominant theories and approaches in MOS still view the natural environment as a pool of long-term resources we can tap into to achieve the ultimate goals of growth and employment (Banerjee, 2003; Carbo et al., 2014; Ergene et al., 2020). This is especially true of the ocean and marine ecosystems, which are overwhelmingly overexploited and destroyed rather than preserved (Pörtner et al., 2019). This section seeks to make the ocean visible to organization studies by describing its importance for humanity and analyzing its organizational affordances.

One ocean, one earth, one health

The ocean plays incredibly important roles for the planet (See the One Planet One Ocean initiative, United Nations Ocean Decade Actions 2021-2030). Indeed, the ocean covers 71% of the Earth’s surface and accounts for 97% of the planet’s water. The ocean not only supports exceptional biodiversity and habitats, it also plays an unparalleled role within the climate system. Indeed, it contributes to 45% of primary oxygen production, via phytoplankton, and absorbs about a quarter of global carbon emissions. It also provides largely underestimated ecosystem services, from food and water supply to energy provision, shelter, cultural values, leisure activities, trade and transportation, and increasingly recognized benefits for health and wellbeing (Costanza, 1999; Pörtner et al., 2019). These services, evaluated more than 20 years ago at \$21 trillion per year, include gas and climate regulation, erosion control/disturbance regulation, nutrient cycling/waste treatment, biological control, habitat, genetic resources, food and raw materials production, leisure and culture, transportation (Costanza et al., 1997). The ocean is therefore central to achieving all the United Nations Sustainable Development Goals (UN SDG).

Ocean acidification counts as one of the nine planetary boundaries, along with biodiversity loss rate or climate change, that, if exceeded, can lead to the destruction of the safe operating space for humanity (Rockström et al., 2009; Whiteman et al., 2013). The planetary boundaries concept describes nine key and crucial parameters that preserve this safe operating space, and that together form a solid basis for rethinking sustainable organizations and human development (Steffen et al., 2015; Whiteman et al., 2013). Two boundaries are directly linked to ocean systems: 1) ocean acidification, which particularly threatens coral reefs and may in turn provoke broader marine or coastal collapses, and 2) interference with biogeochemical nitrogen and phosphorus cycles, which may lead to further eutrophication, dead zones, harmful algal blooms, and

mass extinctions of marine life (Rockström et al., 2009). Climate change, which is measured by atmospheric CO₂ concentration, is a planetary boundary that indirectly affects ocean systems through ice melt, sea level rise, energy imbalances and further ocean acidification (Rockström et al., 2009). Rate of biodiversity loss and chemical pollutions are two other planetary boundaries that can also affect ocean systems.

Billions of human lives are either already affected or will be so by evolutions in planetary boundaries, from rising sea-levels, loss of ice sheets and glacier mass, to extreme weather events, as historical changes and projections under various IPCC scenarios show (Pörtner et al., 2019). In other words, ocean health and human health are deeply connected: when one deteriorates, the other also falls apart (Fleming et al., 2006).

Organizational affordances of the ocean

The ocean presents specific organizational affordances. Here, I follow ecological philosopher Charbonnier (2020) approach of political affordances of the earth, which he defined as the earth's actionable characteristics that constraint politics. In that same line, I analyze the organizational affordances of the ocean, defined as actionable characteristics that affect organizations' actions and in return their impacts on the ocean. The ocean is indeed characterized by several geophysical, biological and socially-constructed constraints, including: 1) incommensurability, complexity, interdependences, multiscale and nonlinearity of marine ecosystems, which enable a political use of scientific uncertainty and can thus result in market failures; 2) the open access and complex property regimes that pose specific governance issues; 3) a structural domination of ocean by humans and land despite the importance of ocean ecosystems; and 4) socially-constructed alleged or perceived inexhaustibility, and cognitive distance resulting in a behavioral decoupling.

First, ocean ecosystems are incommensurable, fragile, complex and nonlinear – nonlinear because effects are not proportional to causes (Norse, 2005). Marine ecosystems involve physical, physiological and biological processes that are more unstable, complex and interdependent than terrestrial ecosystems. Ecosystem reactions to anthropogenic pressures are marked by high uncertainty and unpredictability (Costanza, 1999). Due to volume and marine conditions, conducting scientific measurement of ocean ecosystems is much more technically and methodologically challenging than on land or in the air. For instance, measuring acoustic waves, or marine noise, is particularly difficult because underwater noise will not only travel faster in water than in the air, but it will also be affected by multiple parameters like frequency, duration, intensity of the source, as well as environmental parameters like temperature, depth, pressure, and salinity (Marine Mammal Commission, 2007). *In situ* observations are also exposed to technical failures, which weather and sea conditions can aggravate further. Remoteness makes it harder and more expensive to keep measurement tools in operable service than on land.

In addition, marine resources and environments are less visible than on-land resources which are directly observable, such as in agriculture or forestry (Norse & Crowder, 2005). Aquaculture may share similarities with farming that may make farmed fish more observable, but wild fish is a hidden, moving resource. Observing (and extracting) marine mineral resources also presents extreme challenges, which may explain why deep sea mining has been slow to take off (Sharma, 2015). Furthermore, oceans are less transparent than air to radiations and radio waves: satellite observations can see all land species but fail to see the seafloor below a certain short distance (Norse & Crowder, 2005). Put simply, conducting observations is more difficult at sea than on land. All this

might make it harder to observe and understand the ocean and the impacts of organizations on the ocean.

Next, the ocean also presents specific socially-constructed characteristics. Ocean ecosystems and spaces are generally free access or open access and possess complex property-regime features that raise issues of conservation, access regulation, and governance. These topics have been extensively studied in international law, ecological economics and ocean governance (Brousseau et al., 2012; Costanza, 1999; Ostrom, 1990). As 'global commons', the property rights regimes of the ocean combine common-pool resources, that is to say rivalrous and hardly-excludable goods like fisheries in exclusive water (Ostrom, 1990), but also resources beyond national jurisdiction. 'The global commons include those parts of the Earth's surface beyond national jurisdictions – notably the open ocean and the living resources found there – or held in common – notably the atmosphere' (International Union for Conservation of Nature and Natural Resources, 1980, Chapter 18).

In practice, this status of global commons creates a paradoxical situation where the ocean either belongs to nobody or to everybody, and end up being legally or illegally (over)exploited, privatized, marketized, and commodified through property rights (Mansfield, 2004). Norse and Crowder (2005) suggest that lack of ownership is even more harmful to ocean conservation and biodiversity preservation than for land regimes and conservation. While land species, from trees to wolves, are increasingly protected and highly valued for their roles in ecosystems, 'in the sea, de jure and de facto protections are generally much weaker', whether in cultural or legal terms (ibid:12). In addition, the ocean is much larger than the terrestrial realm, not only in terms of surface area, depth and volume but also in terms of known biosphere, since 99% remains unknown (ibid). The mismatch of scales and marine jurisdictions aggravates the decoupling between organizations able to exploit marine resources and those that take actual responsibility for them (ibid).

The ocean is, paradoxically, structurally dominated by humans and land activities, whereas in reality, humans depend far more on ocean ecosystems than on terrestrial ones (Norse & Crowder, 2005). From a socio-technical systems and value chain perspectives, ocean ecosystems are located downstream of any land activity, meaning that everything produced by any organization will end up in the sea, as rainfalls and streams will eventually drain off all materials, nutrients, and chemicals. Conversely, humans depend on marine wildlife not only for food and resources but also for bundles of ecosystem services, as described earlier (Costanza, 1999).

This structural domination of 'land', despite the importance of ocean for human life and earth, is also related to the perceived inexhaustibility and cognitive distance of the ocean realm. This more generally results from the difficulty in thinking of the ocean as an object of embodied knowledge (Connery, 2006). The ocean seems so large, mysterious and distant that collective imaginaries may see it as endless and bottomless, and therefore able to absorb any pollution, destruction, and litter thrown at it. The ocean's socially-constructed perceived inexhaustibility is aggravated by a cognitive distance, i.e. the non-corporeality of the oceans in the day-to-day lives of most of us, even those who live by the sea: 'Since we live on land, and are usually beyond the sight of the sea, it is easy to forget that our world is an ocean world, and to ignore in practice what that means...' (Langewiesche, 2005: 1).

Both the perceived inexhaustibility and cognitive distance of the oceans may contribute to their overuse and misuse. Not being able to directly witness and empathize with ocean pollution or overexploitation, nor to 'directly' suffer from phenomena like acidification, prevents citizens from cognizing their responsibility when, for instance,

they buy overfished species (Prideaux, 2019). Cognitive distance may therefore contribute to what has been studied as moral decoupling in consumer behavior (Haberstroh et al., 2017) and indifference to intergenerational, interspatial or even intersectional effects of ocean destruction (Costanza, 1999).

These organizational affordances may contribute to market and governance failures, first because markets are unable to adequately measure the social values of ocean asset (Costanza, 1999), and second because scientific uncertainty often serves political interests in shaping international governance (Heazle, 2004). I now turn to review these failures, which I analyze through the negative commons and zombification lens.

Organizations as systems of ocean destruction: the constitution of ocean negative commons and the zombification process of the ocean

In this section, taking inspiration from the collapsologist approach, I provide transdisciplinary evidence of organizations as systems of ocean destruction. Drawing on ecological philosophy, I also argue that organizations as systems of ocean destruction create ocean negative commons. Following Monnin (2021)’s widening of Ostrom’s concept, I define ‘ocean’ negative commons as visible or invisible, material or immaterial organizational outputs or externalities that possess a negative value because they are detrimental to the appropriate functioning and beauty of marine ecosystems and marine life. According to Monnin (2021), these negative commons constitute “ruins” that must be managed, accounted for and retransformed.

Negative commons and the “zombification” of the ocean

A variety of research in earth, life and social sciences emphasizes the scope of these ruins, these ocean negative commons (See table 1). Here, the aim is not to conduct an exhaustive review, but rather to highlight the scope and interconnectedness of ocean negative commons. Public administrations and NGOs are not considered per se in this analysis, but also contribute to create ocean negative commons. Digitalization and digital technologies also contribute to ocean ruining but are addressed separately in the next section.

Table 1: Ocean negative commons: How organizations destroy the oceans

Sectors	Contributions to ocean negative commons
Commercial fisheries & fish processing	Overfishing, ghost fishing, bycatch, habitat destruction, finning, jellyfication, modern slavery, plastic pollution
Aquaculture	Invasive species, biodiversity loss, habitat destruction, pollution (methane, novel entities)
Maritime transportation	Underwater noise pollution, lightning enhancement, habitat destruction, biodiversity loss, degassing, acidification, climate change
Shipbuilding and repair, ports, warehousing and water projects	Underwater noise pollution, acidification, climate change
Underwater observation and technologies	Underwater noise pollution
Offshore extractive industries (e.g. oil and gas, deep sea mining)	Habitat destruction, oil spills, biodiversity loss, degassing, dead zones, underwater noise pollution, acidification, climate change

Tourism and leisure activities	Novel entities, habitat destruction, plastic and marine litter, underwater noise pollution
Chemical industries, industrial processes	Plastic and marine litter, chemical pollution, dead zones, eutrophication
Pharmaceuticals	Chemical pollution, novel plastic and marine litter entities, biopiracy
Agribusiness, food waste value chains	Chemical pollution, nutrient loading, dead zones, <i>Sargassum</i> , jellyfication, eutrophication
Cement and building industry	Sand overexploitation, climate change, ocean acidification
Electricity production (from fossil or non-fossil sources)	Acidification, climate change, nuclear catastrophe
Manufacturing	Chemical pollution, plastic and marine litter, climate change, acidification
Desalinization	Chemical pollution, ocean warming, biodiversity loss
Marine renewable energies	Underwater noise pollution, acidification, marine current and ocean temperature disruptions, biodiversity loss
Blue biotech	Biopiracy, resources overexploitation, biodiversity loss, invasive species

Organizations create a broad variety of negative commons: from habitat destruction to chemical pollution, underwater noise pollution, modern slavery or acidification, marine current and ocean temperature disruptions, biopiracy, and plastic and marine litter. Some of these ruins result directly from anthropic activities at sea, they can be directly traced to a specific point-source pollution and a direct organization, such as an oil spill from an oil tanker. These negative commons – some emergent, others longstanding – can be thought of as marine-industry-specific. This is typically the case of overfishing or the destruction of marine life by deep-sea mining. However, negative commons resulting from non-point-source pollutions are less readily traceable. This is typically the case of underwater noise pollution which, in a given area, can result from a combination of maritime traffic, renewable energy facilities, fishing boats, cruises, and seismic exploration (Berkowitz & Dumez, 2017). In both examples, the organizations involved are part of the wider marine industry, as highlighted in Figure 1, but non-marine industries also have indirect yet significant impacts (e.g. agriculture).

Point-source

Non-point-source

Marine industry-specific	Oil spills; lightning enhancement; overfishing; ghost fishing; bycatch; habitat destruction; finning; methane pollution; degassing; jellyfication; modern slavery	Underwater noise pollution; air pollution; invasive species; water pollutants
Non-marine-industry-specific	Sand overexploitation; nuclear catastrophe; biopiracy	Terrigenous pollution; plastic & marine litter; acidification; seaweed inundation; novel entities; eutrophication; dead zones

Figure 1: Categorization of ocean negative commons by origin and source

The fishing sector alone generates a great number of negative commons: overfishing, which can lead to biodiversity losses; ghost fishing, i.e. marine species that get caught and die in lost or abandoned nets; habitat destruction by fishing techniques, such as ocean floor damage by trawling nets; bycatch or unwanted fish catches that are thrown back into the water, which can amount up to 85% of fishing volumes (Alverson, 1994); finning, i.e. cutting just the fin and throwing back the dying shark. Furthermore, by removing all predators of jellyfish, overfishing can also trigger what has been called a ‘jellyfication’ of marine ecosystems, i.e. uncontrolled jellyfish swarms (Roux et al., 2013). Aquaculture on the other hand may also negatively affect the ocean and fish stocks, through methane pollution (Bonaglia et al., 2017). Beyond environmental pollution, upholding human rights in the seafood value chain is also a major contemporary challenge (Kittinger et al., 2017).

Maritime transportation, tourism, aquaculture and commercial fisheries can all produce non-point-source pollutions, such as the diffusion of invasive species. Invasive species have severe and growing ecological impacts on world biodiversity. In addition to invasive species, any ship or offshore platform will release a number of pollutants, such as antifouling paint which is used on boats precisely to prevent biofouling - tiny organisms attaching to hulls. Ships also throw out food waste, discharge wastewater, and emit severe air pollutants. The shipping industry by itself represents 2.2% of global CO₂ emissions, which are not covered by the Kyoto Protocol, the Copenhagen Accord, or the Paris Agreement (Christodoulou et al., 2019). The cruising industry has also been shown to severely affect air quality in city ports like Barcelona (Ruiz-Guerra et al., 2019). These examples show that some ocean negative commons are actually planetary ones (see Monnin, 2021).

Non-marine-specific industries also contribute to the exploitation and destruction of the ocean and the constitution of ocean negative commons. The construction industry and global demand for cement products have generated a specific new problem that poses challenges for governance of the commons, i.e. the tragedy of the sand commons and overexploitation of other marine materials (Torres et al., 2017). The Fukushima nuclear accident drastically affected marine ecosystems, but this point has gone largely ignored (Buessler et al., 2011). Biopiracy refers to the appropriation by individuals or corporations, especially in the pharmaceuticals space, of genetic resources in developing countries that cannot compete or protect their resources (Arrieta et al., 2010). More generally, the pharmaceutical industry threatens oceans with extensive plundering, especially in the oceans’ twilight zone which harbors most as-yet-undiscovered but potentially promising new species.

Many non-point-source land-based pollution streams provoke nutrient overload, eutrophication, or harmful algal blooms, which has fairly broad effects including the destruction of life (Vikas & Dwarakish, 2015). Such pollution can come from soil erosion, precipitations, atmospheric movements, or ice melt, which all drain pollutants to the sea, making it difficult to identify the polluter organizations. The accumulation of these pollutions in estuaries or closed seas can generate dead zones where organisms can no longer survive, as is the case in the Gulf of Mexico for instance. Industrial pollutions of the oceans range from everything released by facilities, factories, cities and harbors to engine oil that pollutes rivers and ends up in the sea. Sewer wastes also account for an important share of terrigenous pollution in the ocean, causing nutrient-related stresses, as domestic wastewater, products like soaps or detergents, food products, and nonrecycled waters all contain microbes, hormones, pathogens and other elements like polyphosphates that have severe impacts on marine fauna and flora.

As one can see, organizations act as systems of destruction because in creating negative commons they destroy ocean life, which in turn threatens human life if we were to decouple the two kinds. Many of the discussed ocean negative commons closely relate to Bonnet, Landivar and Monnin (2021)'s concept of zombification. The authors describe zombie technologies as those technologies that intrinsically involve resource overexploitation, that have a minimal usage life span and a maximal life duration as waste or as dead technology, hence the name zombie technology. This is typically the case of disposable plastic bags that have extremely short usage life span but remain in the environment for centuries. Zombification describes the transformation process from a living technology (e.g. that use renewable resources, possess long usage life span and short waste span), to a zombie technology, as the authors demonstrate for agriculture (ibid). Here, I suggest that the term zombification of the ocean can be used to describe the broad and systematic destruction of life resulting from the accumulation of negative commons on the ocean.

Organizations as ocean stressors: the complexity of the zombification process

In conservation vocabulary, organizations act as 'stressors' of marine ecosystems (Fu et al., 2018). Stressors are chemical, biological or environmental factors that interfere with an ecosystem's proper functioning by provoking a stress in its organisms (Breitburg & Riedel, 2005). The difficulty in understanding organizations as ocean stressors results from the systemic interdependences and interactions between these stressors. Underwater noise pollution might seem a relatively minor issue in itself, but it adds up to a series of negative commons like overfishing, habitat destruction and acidification. Ocean negative commons affect one another, are deeply interconnected, and the resulting zombification of the ocean has nonlinear effects.

Indeed, cumulated effects disrupt not only individuals but also populations, whole ecosystems, and future generations through species interactions. The cumulation of stressors at these different levels, i.e. individual, population, ecosystem, may produce effects that are quantitatively and qualitatively different than simple addition or even synergy, precisely because of the deep interactions and interdependencies of behaviors, physiological processes, and dynamics at play in these ecosystems (Norse, 2005).

Overfishing in a region can increase the effects of nutrient loading by removing direct consumers, fish, thus creating a trophic cascade that can lead to the collapse of a whole ecosystem (Breitburg and Riedel, 2005). The disappearance of one marine species can lead to a sequential collapse of other species. This was demonstrated in a study on industrial whaling (Springer et al., 2003) showing that the steady decline and disappearance of whales, harbor seals, sea lions and then sea otters can be explained by effects of industrial whaling. When large whales were taken out by industrial whaling,

killer whales could no longer feed on them and so they went after harbor seals, then sea lions, and then finally sea otters. Further, if the population of a keystone predator, that is to say, one that plays a regulating role in an ecosystem, passes a certain threshold, then again, whole ecosystems can collapse, as happened with sea otters and kelp forest in Alaska (Estes et al., 1998). These studies reveal the importance of not only the risks due to combined stressors, but also of tipping points, that is to say points where stressors can trigger major regime shifts (Hicks et al., 2016).

Another example, combined with ocean warming, nutrient overload also enhances *Sargassum* seaweed inundation and belts that strand on beaches. This seaweed, which is colonizing the Caribbean region, endangers tourism, a central activity for these islands. Another class of pollutant is called novel entities, i.e. human-created chemical pollution which includes synthetic organic pollutants, nanomaterials, micro-plastics and radioactives, and which can have lasting effects on ecosystem (Steffen et al., 2015). Some of these novel entities are present in sunscreens, for instance, and are known to affect coral reefs, but may have broader unwanted and unknown effects (Steffen et al., 2015).

Plastic pollution, and marine litter in general, is considered as one of today's major grand challenges. It can be viewed as one of the worst ocean negative commons, the ultimate incarnation of the zombification process. An increasing number of studies show the presence of micro-plastics in all levels of trophic webs, which raises concerns for natural ecosystems and human health (Avio et al., 2017). Plastic degradation has also been proved to produce greenhouse-gas methane and ethylene (Royer et al., 2018), in another illustration of the complexity and interconnectedness of all these ruins and zombie technologies that converge to disrupt global climate. Climate change itself, as a planetary boundary, has complex impacts on the ocean that are still only partially understood but clearly pose existential threats to human societies (Pörtner et al., 2019; UNEP, 2010).

The notions underpinning planetary boundaries articulate concepts like limits to growth and economic development (Meadows et al., 1972) or the precautionary principle in public health management and environmental conservation (Raffensperger & Tickner, 1999). Taking into account these global scale thresholds means acknowledging ocean both as a key contributor to the safe operating space for humanity and as a central source of risks for global collapses, hence the crucial importance of shifting to a paradigm of organizations as systems of ocean conservation.

Organizations as systems of ocean thriving: how to ensure human-ocean socio-ecological coviability?

To operate such a shift, we need to understand the global drivers of ocean negative commons and zombification processes. In this last section, I investigate how organizations conceived as systems of ocean conservation, or better, thriving, can become instruments to enable socio-ecological 'coviability' between humans and the ocean. As mentioned earlier, socio-ecological coviability is a recent transdisciplinary concept (see Barrière et al., 2019) used to describe paths of sustainable, harmonious joint thriving of the human and nonhuman. The idea is to move beyond "blind growth" (ibid, p. 724). To do so, I start by examining global drivers and practices of organizations that produce negative commons: technology and innovation, demand and consumption, marginalization and inequalities, governance systems and social orders. I then examine organizing principles and alternative practices for each driver, in relation to both ocean organizational affordances and the 'Lisbon principles' for sustainable

ocean governance, such as responsibility, scale-matching, precautionary principle, adaptive management, full cost allocation, participation (Costanza et al., 1999) (see Figure 2). I argue that four key organizing principles and resulting alternative practices can change organizations into systems of ocean thriving: 1) degrowth, especially focusing on evidence-based lowest impact innovation, 2) total responsibility on the value chain, favoring local, consumer supported organizations, such as local and seasonal fisheries, 3) full cost allocation and ocean equity, using in particular ecosystemic and intergenerational discounting, and finally 4), place-based, adaptive co-management, enabling local, participatory governance, traditional ecological knowledge and empowering of local communities.

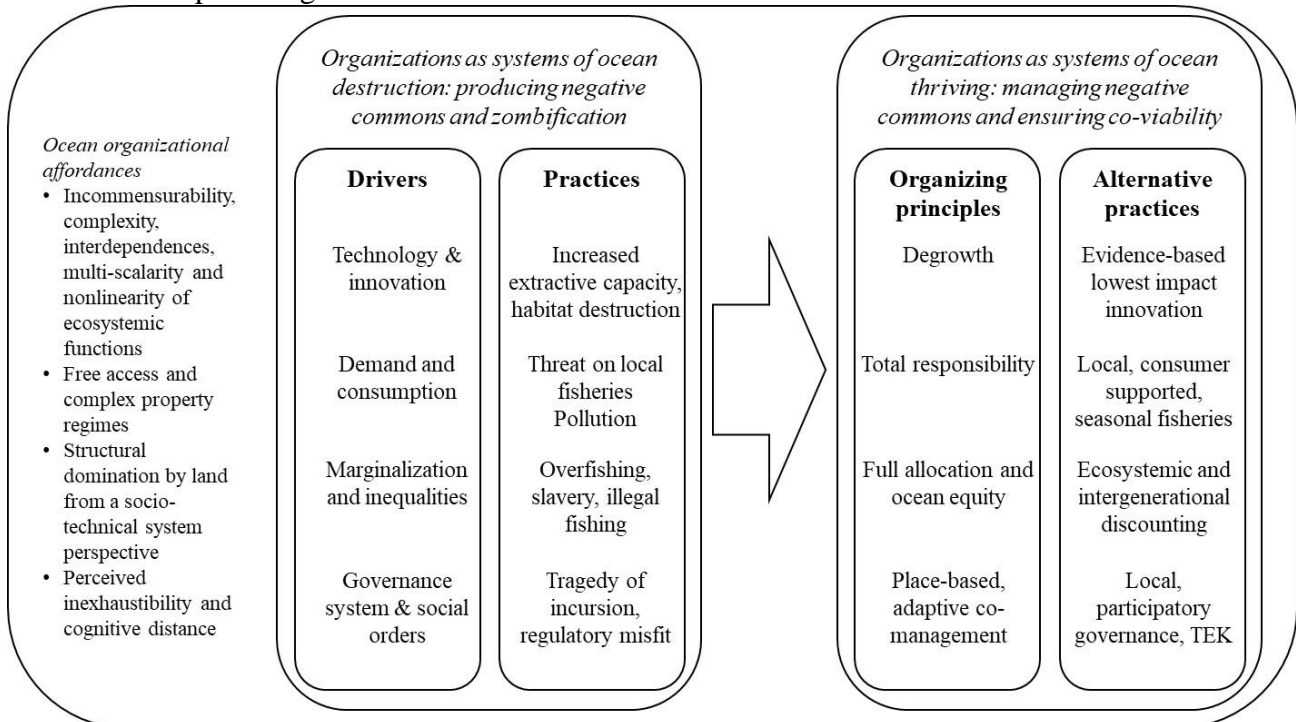


Figure 2: From organizations as systems of ocean destruction to organizations as systems of ocean thriving: drivers, principles and practices

Technology, innovation and the principle of degrowth

Technology and innovation generally constitute major drivers of zombification processes by favoring destructive practices, which increase extractive capacities and consequently habitat destruction (Finkbeiner et al., 2017; Kittinger et al., 2017). In contemporary managerial and political discourses, technology and innovation are almost always considered positively, as something that organizations should pursue at all costs and that will ultimately solve social or environmental problems (Wright et al., 2018). However, uncontrolled innovation can produce serious unintended consequences (Sveiby, 2017). Technological innovation in the fishing sector, for instance, may increase large businesses’ capacities while impoverishing and destroying small-scale, artisanal, coastal fisheries (Finkbeiner et al., 2017; Hicks et al., 2016). Eco-modern narratives of innovation and technology may further aggravate this exploitative system (Wright et al., 2018). Indeed, pro-innovation biases and more generally CSR activities may serve justification fallacies that actually perpetuate marginalization of the environment and society (Carbo et al., 2014; Norberg, 2020). It is the case for instance in the justification of the development of deep-sea mining. Mining companies justify the destruction of the ocean to achieve green energy transition, which is why reducing both in-land and sea mining needs are urgent (Haugan et al., 2020).

On which organizing principle should we generally rethink the development and use of technology and innovation from an ocean perspective? A growing literature argues that degrowth key principle there (see Hickel, 2020 on degrowth). It would allow to consider the specific organizational affordances of the ocean, such as incommensurability and interdependences of marine ecosystems, to guide technology and innovation development for human–ocean socio-ecological coviability. This means 1) reducing the uses and impacts of technology and innovation on ocean ecosystems, 2) addressing the multiscalarity of impacts, as impacts can vary from region to region, local impacts may have global impacts and vice versa (Costanza et al., 1999). Transition thinking argues that achieving transformative sustainability outcomes requires multi-level transformation of production and consumption models, and not merely developing new technologies (see for instance Schot & Geels, 2008; Weber & Rohracher, 2012). This means for instance, that scaling up electric vehicles might lead to further destruction of nature as needs for materials, especially through deep sea mining, increase (Sharma, 2015) and therefore drastically reducing personal vehicle is of paramount importance. As argued earlier, reducing mining material uses and needs should therefore be the objective.

In line with an established approach of scientific precaution (Costanza, 1999), this means going for the evidence-based, scientifically-informed sustainable innovation with the lowest impact on ecosystems. This may even entail no technological innovation at all and rather foster ecosystem recovery, as Chami et al (2019) demonstrate with whale population recovery as a climate change mitigation strategy. Furthermore, developing transformative innovations enhancing cross-scale systemic resilience can positively contribute to ocean conservation (Williams et al., 2019). The variety of sectors and their interdependences highlights the need to factor in the potential competition for space and resources by multiple players (Garland et al., 2019). However, this also suggest innovations and cross-sectoral synergies, for instance between tourism and renewable energies in islands (Michalena et al., 2009). In that perspective, recent works have highlighted the potential of multi-use platforms, a concept that integrates different marine uses in the same space, to offer solutions to reduce uses and pressures (Legorburu et al., 2018). But more generally, low-tech innovation and planning strategies increasingly appear as the best tools for coviability (David et al., 2019; Hernández-Delgado et al., 2018).

Global demand, consumption and total responsibility

Global demand and consumption, mainly from developed countries, is another important set of drivers that largely perpetuates the model of organizations as systems of ocean destruction (Finkbeiner et al., 2017). Worldwide demand and consumption for tuna, for instance, contributes – albeit unintentionally and unknowingly – to overfishing tuna and destruction of its marine habitats. While these drivers increase pressure on specific globally sought-after species, they also aggravate threats to local fisheries jeopardized by the big industrial fisheries. Global demand also increases maritime traffic and transportation pollution, as well as risks of slavery on the global value chain (Kittinger et al., 2017). A similar example is beach sand demand for the global cement industry leading to its overexploitation (Torres et al., 2017).

On which organizing principle should we rethink practices in the perspective of reducing global demand and consumption? Organizations, in a broad sense, including States, must take responsibility for their uses of resources (Costanza, 1999). This also means taking responsibility for historical overexploitation of resources, owing to colonization for instance. Organizations must also be held accountable for the direct and

indirect pressures and pollutions across the whole value chain (Ha-Brookshire, 2017), i.e. for their direct and indirect contributions to ocean negative commons and zombification. The principle of degrowth – of demand and consumption – may be applicable here as well. But building on Costanza et al (1999), I suggest adding to degrowth a principle of what could be called ‘total responsibility’ across the value chain. Total responsibility requires making visible all invisible effects of organizations on human and nonhuman (Carbo et al., 2014) and clarifying responsibility mechanisms in the zombification process.

Understanding total responsibility and its implications for consumption requires a holistic assessment of the social and environmental impacts of consumption behaviors in terms of footprint on the ocean, from production to transportation and recycling (or lack of it). Few academic works have closely examined this total responsibility across the value chain. It is urgent to provide such analyses and assessment tools to ensure that the development of sustainable alternatives, scaling up of responsible innovation and acceleration of transition pathways through demand can be decided based on this principle of total responsibility.

For instance, few consumers know the dramatic impacts of water sports on ocean health. Wetsuits are usually made of neoprene, either based on petroleum or limestone, which are both extremely harmful to the environment. Patagonia and other responsible surf companies following in its footsteps, like SOÖRUZ or Finisterre, have recently been developing innovative and eco-responsible material for wetsuits (i.e. a natural rubber). (see O’Rourke & Strand, 2017 on the challenges facing Patagonia for the development of sustainable products.) However, most of the water sports industry is still using normal neoprene and demand for greener alternative is still low. Applying total responsibility would imply for instance banning environmentally destructive products, regulating more strictly their uses, developing actionable information for consumers, such as labels, among others. Taking another example, in the case of overfishing, total responsibility might also translate into encouraging more local and seasonal consumption of small-scale seafood (Bjørkan et al., 2019) and community-supported fisheries (McClenachan et al., 2014).

Marginalization and equity: ensuring full cost allocation and ocean equity

Next, an important factor that perpetuates the paradigm of organizations as systems of destruction is marginalization in terms of rights, access or management of resources and power asymmetries (Finkbeiner et al., 2017). The link between poverty and globalization is exacerbated in the ocean (Costanza, 1999). For instance, marginalization of local fishing communities by big industrial fisheries and distributors aggravates zombification processes. It indeed forces local fishermen and women to illegal, unsustainable practices, like harvesting wild marine fauna in coastal Western Africa for subsistence (Prideaux, 2019). Marginalization also drives modern slavery (Finkbeiner et al., 2017; Kittinger et al., 2017). Furthermore, the literature has shown that one key factor in transitioning to a sustainable future is access to and levels of resources (Barrutia & Echebarria, 2015; Russo, 2003). Indeed, moderate to low levels of relational resources, i.e. relationships and networks with governments, can explain low levels of sustainability engagement (Barrutia & Echebarria, 2015). For Garland et al. (2019), the question of marginalization more generally relates to an issue of justice, for both “EU and US perspectives of the [Blue economy] are characterized by a lack of an integration of the sustainability and social justice principles” (p. 11).

On which organizing principle can we rethink organizational practices with regard to marginalization and equity? I argue that a double principle of full cost allocation

(Costanza et al., 1999) and ocean equity (Bennett, 2022) is needed. The full cost allocation principle implies to systemically identify, evaluate and assign responsibility for all internal and external costs and benefits for a decision to exploit ocean resources (Costanza et al., 1999). Full cost allocation would allow ocean equity, which translates into six dimensions according to Bennett (2022): recognitional equity (i.e. acknowledging local rights, knowledge, values, needs among others), procedural equity (i.e. including stakeholders in governance processes, ensuring transparency and accountability of procedures), distributional equity (i.e. fairness in benefits allocation), management equity (i.e. empowerment of local stakeholders), environmental equity (i.e. conserving local nature's health and benefits to people) and contextual equity (the articulation of multi-level equity in institutions to ensure social fairness). However, one could argue that this definition of ocean equity remains too anthropocentric and ignore the relational dimension between human and non-human. Ecosystemic equity could be defined as ensuring the well-being of the whole ecosystem. Ecosystemic equity could either replace environmental equity as a more inclusive dimension accounting for all forms of life in the ocean without instrumentalizing nature for human's need, or be added as an additional dimension.

In that line of thought, conventional cost-benefit analyses of ecosystem restoration tend to discard future net benefits, through discounting methods putting the emphasis on current generations rather than future ones (Sumaila, 2004; Sumaila & Walters, 2005). Recent pioneering works have begun to rethink discounting methods to include marginalized populations, for instance women, as well as future generations (Teh & Sumaila, 2020) and to theorize social welfare applied to multi-species communities beyond humans (Fleurbaey & Leppanen, 2021). As a legal tool, climate reparations applied to the ocean could also mark an important step towards addressing inequality and injustice relative to climate change and environmental impacts from a more inclusive and systemic perspective (Perry, 2020). By more fairly allocating costs and benefits, the objective is to integrate ecosystemic, environmental, social but also interspatial, intersectional, and inter-generational justice. In a sense this principle relates with the total responsibility principle. Ocean equity, by its definition also relates to governance systems, which I now turn to.

Rethinking social orders: alternative governance systems and adaptive, place-based co-management

Lastly, governance and management systems and institutions may also constitute drivers of pressures on oceans (Finkbeiner et al., 2017). Governance systems and institutions may produce regulatory misfits or free-rider mechanisms. Public policy, regulatory instruments or management practices that are not embedded in local contexts and not sensitive to their specificities can foster exploitative behaviors and increase overexploitation and destruction of the ocean's life (Berkowitz et al., 2020; Finkbeiner et al., 2017). This can happen for instance when public policies incentivize the entry of external, international players through subsidies, thus flooding local capacities and producing a tragedy of incursion (Young, 2001). Another example is women's contributions to the seafood value chain, which are largely neglected, especially in the processing and finance segments of the chain. When governance ignores the roles of women, as a result of marginalization processes, mis-tailored policies tend to focus solely on men and further aggravate gender inequalities (Harper et al., 2013; Kleiber et al., 2015).

In a way, this issue connects with the broader question of social orders, of how they come into place, evolve or not and provide the basic context for solving grand

challenges like ocean conservation (Berkowitz & Grothe-Hammer, 2022). The notion of social order describes the general process of ordering society, putting into place social structures like rules or hierarchies that give the world some form of predictability (ibid). Shifting paradigms in organizations requires to profoundly transform social orders. Indeed, existing social orders are at the root of current problems and grand challenges and only transforming these social orders can lead to fruitful alternatives. This also connects with recent debates around alternative forms of organizing and meta-organizing to tackle grand challenges (Arciniegas Pradilla et al., 2022; Berkowitz & Grothe-Hammer, 2022; Ferraro et al., 2015; Kaufmann & Danner-Schröder, Forthcoming). And as Barrière et al (2019) also argue, ensuring socio-ecological coviability requires new sets of rules and new legal concepts.

On which organizing principle can we now rethink governance models and social orders? I argue that adaptive, place-based co-management is needed to help shift paradigms. Further developing Ostrom's (1990) foundational work, a growing body of evidence indeed demonstrates the importance of engaging participation from various constituencies in a co-management approach (Armitage et al., 2009; Costanza et al., 1999). Transition thinking also stresses the importance of co-management to create shared agendas for sustainability transition (Fernández & Romagosa, 2020). Scale-matching and responsiveness to local socio-environmental contexts and global challenges is essential for sustainable ocean governance (Costanza et al., 1999). This means that co-management approaches must be embedded in local contexts and tailored to the geographical, ecosystemic, cultural, institutional, historical, infrastructural specificities of places and territories (Berkowitz et al., 2020; Coenen & Truffer, 2012).

Recent literature has for instance investigated new practices implementing this general principle and aiming at facilitating multi-stakeholder, participatory engagement. For instance, co-management committees in Catalan fisheries enable different types of stakeholders, from education and research organizations to actors in the economy, public administrations and NGOs, to make joint decisions about fishing plans and strategies (Berkowitz et al., 2020; Bjørkan et al., 2019). Recent works also show that this kind of adaptive, place-based co-management often draws on and significantly values traditional ecological knowledge (TEK) (Pita et al., 2016). It also contributes to empowering indigenous communities (White, 2020), and fostering gender equity (Freitas et al., 2020), thus generally reinforcing the principle of ocean equity discussed earlier.

Discussion: towards an ocean-centric approach for MOS?

The objective of this paper was to explore how to operate a shift from organizations as systems of ocean destruction to organizations as systems of ocean thriving. To do so, the paper drew on a pluridisciplinary approach, taking inspiration from various literatures, from collapsology to ocean conservation and ecological philosophy. I began by analyzing the significance of the ocean for management and organization studies and by describing the ocean's organizational affordances. Taking inspiration from ecological philosopher Charbonnier (2020), I defined these organizational affordances as actionable characteristics that constraint the actions, practices and impacts of organizations on the ocean: 1) incommensurability, complexity, interdependences, multiscalarity and nonlinearity of marine ecosystems, which enable a political use of scientific uncertainty and can thus result in market failures; 2) the open access and complex property regimes that pose specific governance issues; 3) a structural domination of the ocean by humans and land despite the importance of ocean ecosystems; and 4) socially-constructed alleged or perceived inexhaustibility, and

cognitive distance resulting in a behavioral decoupling and indifference to intergenerational, interspatial or even intersectional effects of ocean destruction.

I then provided transdisciplinary evidence of organizations acting as systems of ocean destruction. I therefore added to a large body of research in marine, earth and social sciences attempting to assess impacts on the ocean (Antunes & Santos, 1999; Arbo et al., 2018; Bell et al., 2018; Berkowitz & Dumez, 2017; Costanza, 1999; Pörtner et al., 2019; Torres et al., 2017; Vikas & Dwarakish, 2015). Owing to their activities and the holistic, interconnected and multi-level nature of their footprints, all organizations from all sectors contribute to some extent to the creation of ocean negative commons and to the ocean's zombification. I define ocean negative commons as visible or invisible, material or immaterial organizational outputs or externalities that possess a negative value because they are detrimental to marine ecosystems' wellbeing. This work thus extends recent theorizing efforts of (negative) commons (Bonnet et al., 2021; Monnin, 2021). While this assessment is by no means exhaustive, it draws a broad picture of ocean negative commons: from overfishing to eutrophication, from sand overexploitation to biopiracy, from climate disruption to biodiversity loss and habitat destruction. I also show that the ocean zombification process – the systematic transformation of ocean life into ruins – is all the more complex that ocean negative commons feed each other and may converge to trigger collapses of whole ecosystems or severe regime disruptions. This paper thus dispels a general misconception that only some activities (e.g. through plastic pollution or carbon emissions) negatively affect the ocean. On the contrary, I emphasize that all organizations constitute systems of ocean destruction, especially in the Western paradigm of economic growth and industrial exploitation of life.

On these foundations, I then put forward a framework of organizations as systems of ocean thriving. Taking into account the ocean's organizational affordances and global drivers of ocean zombification (i.e. technology and innovation, demand and consumption, marginalization and inequalities, governance systems and social orders), I suggested alternative organizing principles and practices: 1) a principle of degrowth, especially focusing on evidence-based lowest impact innovation, 2) a principle of total responsibility on the value chain, favoring local, consumer supported organizations, such as local and seasonal fisheries, 3) full cost allocation and ocean equity, especially based on ecosystemic and intergenerational discounting, and finally 4), place-based, adaptive co-management, enabling local, participatory governance, traditional ecological knowledge and local communities empowerment. This framework helps conceive organizations that support ocean conservation, recovery and thriving, and thus act as instruments of socio-ecological co-viability.

This work contributes to recent developments in ecological thinking (Barrière et al., 2019; Bonnet et al., 2021; Charbonnier, 2020; Servigne & Stevens, 2015), by surfacing the theoretical and analytical insights that MOS can provide to such endeavors. These perspectives tend to neglect 'organizations' not only as a unit of analysis but also as a lever of action for sustainable human–ocean development. As mentioned though, organizations, and social orders in general, both are at the roots of current problems and provide the basic context for solving them (Berkowitz & Grothe-Hammer, 2022). This paper recasts organizations as the missing link between humans and the ocean in these approaches. Organizations can indeed act as instruments of human–nonhuman socio-ecological co-viability, under certain conditions, that is to say the organizing principles of the framework.

This work also contributes to eco-centric approaches of MOS by developing an ocean-centric perspective and detailing its specificities and implications. The paper thus seeks

to give greater literacy to the ocean in MOS in general. Future research could further give voice to the ocean in MOS. For instance, it would be useful to deconstruct the process of silencing and negation of the ocean, both in public discourse and public policy and in the academic field. The ocean can indeed appear as a form of “devalued other” that is silenced and excluded (Hearn, 1996). Dead zones are the concrete embodiment of this process of silencing. This silencing of the ocean, its invisibility in MOS, contributes to a process of domination in contemporary society and organizations, that goes hand in hand with violence, overexploitation, habitat destruction and biodiversity loss (Mies & Shiva, 1993). Dismantling a domination process requires deconstructing the relations between dominant and dominated (Hearn, 1996). Deconstruction has been on the agenda of critical organization studies for a while now, targeting various objects or subjects the relationship, but few efforts have been made to closely examine nonhuman as a colonized space or being.

In that perspective, efforts to developing ocean-centric MOS requires to shift to a paradigm that views relationship between human beings, organizations and the ocean as a different ‘ecological agencement’ where participants are made available and visible to each other (Savransky, 2020). This paper views organizations as a hyphen between humans and the ocean, potentially enabling both to remain healthy and harmonious. Contributing to and going beyond the corporate environmentalism analysis (Sandhu, 2010), this paradigm shift requires efforts to inclusively transform innovation, justice, valuation or management approaches to address the ocean’s health. It also means rethinking accounting models to incorporate the ocean as well as marginalized communities and future generations so that they can enjoy present and future benefits of the ocean, which primarily hinges on developing ‘total responsibility’ of organizations across all salient value chains.

An ocean-centric approach to organizations develops a different relation to the ocean (or nature in general) than perceiving it as a stakeholder. Indeed, stakeholder approaches in business ethics still consider that “the natural environment is an important business environment” (Starik, 1995, p. 215). Stakeholder approaches to the natural environment thus perpetuate models of domination and destruction of nature and a hard separation between humans and the natural world (also see Banerjee & Arjaliès, 2021 on how new concepts in organization theory perpetuate ‘Western’ ideas). Here, by showing how planetary boundaries and the safe operating space for humanity are put at risk because of ocean zombification, this paper underlines the vital urgency of shifting paradigm, of not only conceiving but also regulating organizations as instruments of socio-ecological coviability. With this vision, unfettered financial performance, economic growth and development appear incredibly lethal but also increasingly irrelevant. This ocean-centric approach exposes the perils of designing ‘blue growth’ schemes at national and international levels. However, much more work than this paper can offer is still needed to understand the limits of the suggested alternative organizing principles, and to what extent they themselves carry colonial legacies and Westernized thinking (Banerjee & Arjaliès, 2021; Perry, 2020). Exploring this issue would enable organization scholars to achieve a more radical engagement in tackling grand challenges such as climate change or ocean acidification and their complex interdependencies (Ergene et al., 2020; George et al., 2016).

Future research moving forward with this ocean-centric perspective could valuably investigate, unravel and articulate the alternative organizing principles of degrowth, total responsibility, full cost allocation and ocean equity, and adaptive, place-based co-management. There can be fruitful applications by challenging, extending or refining of this framework to address challenges like deep sea mining, the opening of the Arctic

Ocean shipping lanes, massive algae blooms, modern slavery in the seafood value chain or other problems and negative commons identified in this paper. This framework provides a lens through which to look at organizations, and can provide a valuable starting point for generalization to other settings like global environmental commons. This means not only high seas but also the atmosphere and outer space, and transboundary commons, such as multi-organizational, multi-stakeholder, cross-border commons like parks or rivers (Miller, 2020).

However, raising awareness about these impacts of organizations as systems of ocean – or nature – destruction remains a major challenge. Artistic creations can have important outreach effects on communities (Jónsdóttir, 2019) and it could be interesting to investigate the place of visual art in making the destruction of the ocean more visible to societies, and thus counteract the decoupling of individuals and organizations from the ocean. Action-oriented research, which brings together a variety of participants and forms of knowledge to enact sustainability transformations (Caniglia et al., 2021), may prove valuable as a tool to co-create the necessary shift.

Concluding thoughts

Most approaches or theories in MOS tend to view the so-called natural environment as a pool of resources to tap into, or simply as an external factor to organizations (Banerjee, 2003; Ergene et al., 2020; Sandhu, 2010; Shrivastava, 1994). Few studies consider nonhuman entities as a stakeholder or even acknowledge that organizations in fact belong to nature (Laine, 2010; Starik, 1995; Taupin, 2019). While a shift of paradigm in corporate environmentalism can be traced (Sandhu, 2010), the dominant design in businesses remains that of extractivism, exploitation and destruction. In the dominant anthropocentric view of organizations, the human is not an integrative part of the natural environment, and the nonhuman is simply capitalized and commodified (Barrière et al., 2019). Existing narratives put the emphasis on demographics as causes of climate change and ignoring the roles of organizations, innovation, consumption in destroying the living (Finkbeiner et al., 2017). These narratives perpetuate these dominant paradigms and lead to ill-advised policy-making and managerial approaches, thus aggravating problems rather than solving them. The ocean itself is largely ignored in the organizational scholarship and public policy, and we still understand relatively little about the necessary transformations of organizations to ensure a harmonious, interdependent, sustainable evolution of both the human and nonhuman.

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