

Case Study: Applying Ostrom's Core Design Principles To The Marine Protected Management Of South Africa's Oceans

Julia Schaeper, PhD candidate, University of the Arts London, j.schaeper1@arts.ac.uk

Gillian Hamilton, Twig Consulting, Gill@TwigConsulting.co.za.

Sumit Kothari, PhD candidate, University College London, sumit.kothari.16@ucl.ac.uk

1. Introduction

In this paper, we assess the relevance and applicability of Ostrom's design principles (DPs) for the sustainable use and conservation management of the oceans surrounding South Africa. Specifically, we aim to understand whether a commons-based logic can be used to foster improved solutions for the genuine tragedy of the unmanaged "commons", managing biodiversity in our oceans for all stakeholders.

We begin by exploring the wider theoretical framework including the theories of the commons and then proceed to apply a commoning logic (environmental, cultural and social) to the context of Marine Protected Areas (MPA) in South Africa and the impact it would have on local MPA management practice.

2. Theory of the Commons

The Classical Theory of the Commons

The Classical theory of the commons is mostly attributed to Garrett Hardin and Elinor Ostrom, who have ushered the concept of commons into the scientific mainstream in the past decades. As Ostrom often points out, the term was almost non-existing in academic literature until Hardin's article on the commons in 1968. The classical theory of the commons as defined by Hardin and Ostrom, connects to neoclassical theories of goods in economic, legal and political science, which preceded both authors.

The ecologist Garrett Hardin believed in "The tragedy of the commons" - a well-known phrase that has captured people's imaginations for generations. It is an essay written by Hardin in 1968 who uses the metaphor of an open-access pasture and argues that the collective use will lead to the collapse of the "common" resource. He described that the rational behavior of the shepherds will be to add more and more cattle in order to maximize their gains, and it will eventually lead to an overgrazing and ruining of the pasture. In economic terms, the individuals will benefit, but the cost will be collective. That is why he coined the phenomenon a tragedy. Following his analysis, Hardin

proposes two options for solving the problem, either through central regulation or privatization.

A major critique on the concept of Hardin was brought up by Nobel laureate Elinor Ostrom who points out that what Hardin is speaking of is a common-pool resource not commons. Another critique by Ostrom is that Hardin excludes communication in his model. She argues that by communication, rational thinking shepherds would come to agreements on managing the grazing of the pasture and designing rules for managing their resources. Yet another critique comes from the geographer David Harvey who argues that the problem in Hardin's model might not be that there is a common pasture but that cattle are private property. If there was no private property, there would not be an individual motive for maximizing profits.

Ostrom disagreed with Hardin's thesis, proving that shared resources could in fact be managed effectively as communities set rules for access to and use of resources. Her empirical research established that collaborative management of common pool resources, or commons, is possible for economic and environmental sustainability. In her research, Ostrom studied communities that share their resources and proved that they can manage those shared resources effectively. She defined commons as "a resource shared by a group of people" and also found that the community sets rules for access and use of resources by communication, and sanctions can be implemented to fight the abuse of the community rules. According to Ostrom, constitutional rules define who constitutes community and what constitutes resource. Collective-choice rules define certain directions and changes in the governance of the resource, while operational rules define daily use and provision of the resource (1990). Based on empirical findings, Ostrom derived eight design principles on what makes common-pool resources successful through a commoning management practice:

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1. **Clearly defined boundaries**
Individuals or households who have rights to withdraw resource units from the CPR must be clearly defined, as must the boundaries of the CPR itself.
 2. **Congruence between appropriation and provision rules and local conditions**
Appropriation rules restricting time, place, technology, and/or quantity of resource units are related to local conditions and to provision rules requiring labor, material, and/or money.
 3. **Collective-choice arrangements**
Most individuals affected by the operational rules can participate in modifying the operational rules.
 4. **Monitoring**
Monitors, who actively audit CPR conditions and appropriator behavior, are accountable to the appropriators or are the appropriators.
 5. **Graduated sanctions**
Appropriators who violate operational rules are likely to be assessed graduated sanctions (depending on the seriousness and context of the offense) by other appropriators, by officials accountable to these appropriators, or by both.
 6. **Conflict-resolution mechanisms**
Appropriators and their officials have rapid access to low-cost local arenas to resolve conflicts among appropriators or between appropriators and officials.
 7. **Minimal recognition of rights to organize**
The rights of appropriators to devise their own institutions are not challenged by external governmental authorities.
- For CPRs that are parts of larger systems:*
8. **Nested enterprises**
Appropriation, provision, monitoring, enforcement, conflict resolution, and governance activities are organized in multiple layers of nested enterprises.
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Figure 2: Ostrom's Design principles illustrated by long enduring CPR institutions

The Critical Theory of the Commons

The theory of the commons as presented by Ostrom inspired many scholars to research commons in theory and practice. They sought to evolve the approach through critical theory by theorising about how and in which direction to transform society, towards tackling the many challenges we are facing today. Various critical authors have therefore built upon Ostrom's theory of the commons and taken it to more contested, relational and political directions with the ambition to construct the commons as a new paradigm and as a movement aiming to transform the society. Through this perspective, attention shifts away from the so-called 'natural' commons and instead focuses on the emergent possibilities of the 'social' or 'immaterial' commons. These include knowledge and cultural commons (Hyde 2010), digital commons and peer-to-peer production (Bauwens 2005) and biopolitical commons (Hardt & Negri 2009). Critical theorists perceive commons not as something static such as goods but as being dynamic, such as social relations and come to the conclusion that 'commoning' is everywhere but widely misunderstood. Commons cannot merely be considered as goods but as a deeply social practice that creates, uses and preserves common resources and products. So it is the activity of 'commoning' that is seen to be crucial for the existence of the commons. If commons are used, it implies that they are produced and consumed. The term "use" also stresses the "use value" of commons, as opposed to the "exchange value" determined by the markets. Critical scholars argue that if there are no inherent

characteristics that make some goods commons (like the neoclassical economists believed) then commons should be defined differently all together.

By drawing on Ostrom's Governance theory of commons, these critical scholars define commons beyond a natural resource as a living, self-organising system. These systems are defined through three elements that are in a mutual relationship, firstly resource, secondly community and finally institutions.

- *Resources:* Resources describe all that is useful and valuable to humans. This expands the applicability of the commons as described in the classical theory of Ostrom, who at the beginning only applied it to natural common-pool resources and expands it to non common-pool resources like language, knowledge and information. The resources that are governed as commons can be traditional, like a pasture governed for hundreds of years, or modern, like the open source software repository that has been governed only for the past few decades.
- *Community:* Most of Ostrom's cases were related to local communities, but critical theory broadened it to digital resources (like the Wikipedia, which are governed as commons through assistance of information-communication technologies by communities whose members have no geographical proximity) and a group of humans who share the same values, norms and needs.
- *Institutions:* Institutions should be understood here as recurring social practices by users related to some resource governed as commons. Institutions are at the same time "rules" that constrain users' behaviour and organisations (which are seen as entities that users establish for some collective goals). Institutions are designed and implemented by communities in order to use the resource in a way that optimally benefits all users and prevents overusing, underusing and abusing.

Institutions are the core of the governance regime of the commons, while the governance of commons and the application of the DPs through institutions is called "commoning". This means that commons don't exist because of certain characteristics (as the neoclassical economics define them) but they are created through a certain governance regime not related to state or market. Commons are constituted by the social practices of commoning that are based on voluntariness, autonomy and needs-satisfaction. Commoning involves idiosyncratic creativity, improvisation, situational choices, and dynamic evolution that can only be understood as aliveness (Bollier and Helfrich, 2015). Instead of focusing on resources as stocks that a price mechanism transfers among people, there is an opportunity to focus on understanding the complex flows of resources that are accessed and used according to the rules made

by commoners themselves. Instead of looking to impersonal market transactions as the only way to meet needs, we can see that commons is a practical alternative that can emancipate people from non-functioning structures.

Based on the understanding of commons as a living, self-organising system, scholars also began to differentiate between the different types of commons and how people would access them. In order to distinguish “desirable” from “undesirable” commons, Helfrich defined three normative criteria of the commons—sustainable use, fair access and collective control. These criteria should be used as guidelines for assessing whether some social practices could be considered commons, but also as guiding questions for political debate, as every social practice depends on the context. Also, there can be no progressive production of commons without the transformation of reproduction and everyday life that starts with the communalisation of care work and its equal division between men and women. She defined what was referred to as progressive commons. When it comes to natural commons, which are usually based on scarcity, a normative debate began on what grounds to limit user access to satisfy ecological sustainability. Many progressive activists advocate some restrictions in the use of natural common-pool resources like forests, water and fisheries. Unlike natural commons, cultural commons like knowledge, information, ideas, language, programming code are more valuable if they are used by a greater number of users, so many progressive activists advocate for unlimited access. It could be argued that it is fair that most cultural commons should be open access, while most natural commons should be restricted access.

3. Case Overview: How are Marine protected areas managed in South Africa?

The oceans around South Africa are enormously diverse. This diversity means that the marine and coastal zones in South Africa have extensive economic and developmental opportunities – through fishing, shipping, tourism as well as new and emergent technologically advanced sectors relating to medicine, energy, mining and food production (WWF-SA, 2016; DEFF, No date; Jarre, et al., 2018). However, the oceans surrounding South Africa are a contested commons as contradictory state policies advocate for the production of offshore oil and gas, directly in opposition to marine protection services, fishing and tourism. Moreover, the oceans face extensive pressure in the form of pollution, overfishing and climate change impacts.

Marine Protected Areas as a way to govern the ocean

Marine protected areas conserve biodiversity, enhance resilience, enhance fisheries, and act as an insurance policy if other types of fisheries management do not work. They protect and restore endangered species and ecosystems. They are sites for education and research and can attract tourists and provide alternative livelihoods for communities. As such, the ocean ecosystem is made up of a range of key actions, including both human and non-human

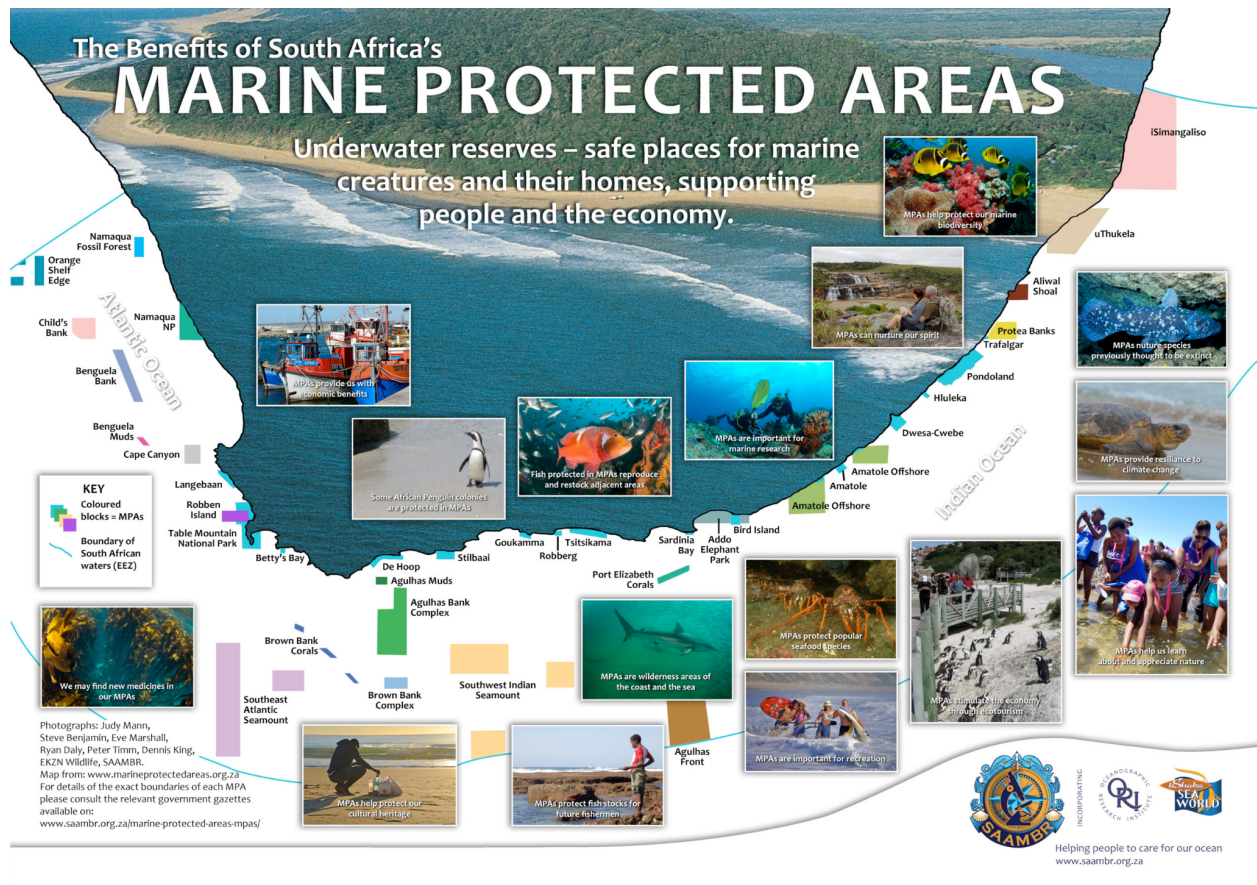


Figure 4: Map of marine protected areas (Source: <https://www.saambr.org.za/marine-protected-areas-mpas/>)

In an effort to conserve and improve the management of marine and coastal resources, in 2019, South Africa increased the number of Marine Protected Areas (MPAs) from 25 to 45 with the 20 new MPAs expanding the protection of South Africa's mainland ocean territory to 5%. Additional research and planning are underway to identify further priority areas for protection to support the long-term goal of 10% ocean protection around South Africa.

International Union for Conservation of Nature (IUCN) defines MPAs as “A clearly defined geographical space, recognised, dedicated, and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (DFFE; SANBI; NDP2030, No date). MPAs are a policy instrument to address the pressures on marine biodiversity, marine and coastal ecosystems such as overfishing and exploitation; habitat destruction; pollution; coastal erosion; reduced freshwater flows into the marine environment; alien invasive species and climate change (Western Cape Government, 2018; Gwebani, 2021). In South Africa, they have three classifications:

- **Restricted Areas:** These areas are commonly known as ‘No-Take’ areas, where the extraction and harvesting of any marine or plant life isn't allowed.
- **Controlled Areas:** These areas are also known as ‘Open’ areas. In these areas you're allowed to fish, go diving, spear fish, scuba dive and whale watch given that you have a valid permit.
- **Restricted and Controlled Areas:** Some MPAs have specifically demarcated areas that are zoned as both Restricted and Controlled areas that allow fishing, including subsistence fishing and some recreational activities, with permits (Western Cape Government, 2018).

There seems to be general agreement that MPAs need more effective management in order to achieve the biodiversity aims they have set out to achieve. Dr Judy Mann from the South African Association for Marine Biological Research notes that although MPAs may be declared, in some cases ‘paper parks’ occur. ‘Paper parks’ are areas where despite an MPA being proclaimed, destruction and exploitation continue due to a lack of regulation, under funding and inadequate management (Thornton, 2021).

Building effective MPA management practices requires knowledge and skill, especially when an MPA spans across a large marine area, multiple languages, cultures and species. It is in this context that we seek to test the applicability of the commons-based design principles to examine the challenges and successes of MPA management and understand the potential of a commons-based logic for improvement.

The challenge of managing MPAs

Gwebani (2021) asserts that the establishment and management of MPAs in South Africa have occurred at the expense of the livelihoods and customary rights of rural fishing communities. Moreover, many of the major marine protected areas in South Africa have dispossession legacies from Apartheid due to race-based removals from both land and seascapes during the 1970s and 1980s, resulting in the protection of

biodiversity, at the expense of rural and indigenous communities (Gwebani, 2021). The fishing community often views the long-term benefits of MPAs as high risk since there is no guarantee that the increased productivity associated with MPAs will provide a benefit within a time frame that allows them to remain in business. Moreover, there is little that can be done to prevent some of the major negative effects that can, and often do, result from a temporary loss of income—for example, housing troubles and insurance issues. One approach to alleviating short-term income loss is benefit-sharing between stakeholders. In this method, user fees from non-extractive groups such as tourists provide a source of stabilizing income to local fishermen during the first seasons of designation (Lubchenco and Grorud-Colvert, 2015). For example, in Tubbataha Reefs Natural Park in the Philippines, the benefit share was financed through user fees from divers and dive operators, as well as through grant payments from outside donors (Padilla, Tongson, and Lasco, 2005).

Both Gwebani (2021) and Mann (Thornton, 2021) agree that comprehensive solutions to conserve and protect oceans should be devised by focusing on inclusivity. Thus, it is crucial to include local communities in the establishment and management of marine protected areas in order to reduce poverty, conflict and food insecurity. Moreover, Gwebani (2021) adds “the government relies solely on scientific research, ignoring the wealth of indigenous knowledge that exists when choosing and establishing marine protected areas. This undercuts the customary rights and practices of rural communities”. In addition to including local communities, MPAs should have co-management structures that ensure the needs of small-scale fishers are taken into account together with the biodiversity protection that marine protected areas are supposed to deliver (Gwebani, 2021).

The State highlights the main challenge in fisheries which is to create a balance between maximising the social and economic potential of the fisheries industry; protecting the integrity and quality of the country's marine and coastal ecosystems and addressing transformation in the sector. In order to improve communications and management of MPAs, a MPA Forum was established in SA by WWF. The objectives of the Forum was to work with all the role players in the SA MPA sector to:

- Improve MPA management effectiveness and capacity development
- Foster collaboration and information sharing between MPA stakeholders in Southern Africa
- The implementation of an integrated, multi-stakeholder approach to MPA Governance in Southern Africa (WWF; DFFE, 2021).

However, this Forum has not been funded since 2017 and thus has not been able to continue its work of bringing together key role players in the South African MPA sector from Government, Management Agencies, Research Organizations and Academia, NGO's, Coastal Communities and others to improve coordination between stakeholders and support capacity development across the sector (WWF; DFFE, 2021).

Other challenges and complex issues include the intention by the state to authorise offshore oil and gas mining; overfishing in South African waters creating competition not only between small-scale fishers and commercial fisheries but extensive competition between humans and seabirds that are dependent on fish for their food; environmental challenges like pollution, biodiversity loss, trawling, ocean acidification; and, social issues like food security, jobs, conflict between conservation and businesses, and international conflict.

Mapping the ocean ecosystem actors

The Oceans

Stretching from the northern bank of the Orange River on the Namibian border to the Mozambique border, South Africa has 2,798 km of coastline (DEFF, No date; Naidoo, 2020; WWF-SA, 2016). This coastline harbours three different oceans - the Indian to the east, the Southern to the south, and the Atlantic to the west. South Africa's oceans have an incredible diversity of habitats, that include cool-water kelp forests, deep sea muds, subtropical reefs, mangroves and both rocky and sandy shores (DFFE; SANBI; NDP2030, No date). Consequently, these habitats have extensive biodiversity with as many as 10,000 species of marine plants and animals recorded. Marine life that is not harvested is increasingly recognised as a valuable resource for nature-based tourism (DFFE; SANBI; NDP2030, No date). Although the oceans have some protection through various pieces of legislation in South Africa, they are largely taken for granted and have been subjected to extensive human exploitation. The Oceans themselves do not have legal rights and nor are they recognised as sentient beings.

Fish

Similarly to the oceans, the fish do not have legal rights and nor are they recognised as sentient beings. There are over 2,000 species of fish found in South African waters and of these, 16% are endemic (DFFE; SANBI; NDP2030, No date). Fish species are largely tropical and subtropical, and range from tiny gobies to huge whale sharks, and include both bony fish and cartilaginous fish, such as sharks and rays (DFFE; SANBI; NDP2030, No date). Commercial, subsistence and recreational fisheries in South Africa catch more than 630 marine species, most of them fish species. Five species make up 79% of the total value of the commercial fishing industry (Brick & Hasson, 2018). The

main species caught in 2017 were anchovy (260 000 tonnes), hakes (143 000 tonnes) and pilchard (79 500 tonnes) (FAO, 2018). Squid jig and West Coast Rock Lobster are the other two most valuable species. The South African fishing industry is regulated by the DEFF and is controlled by a quota or permit system which limits the 'total allowable catch' (TAC) of each permit holder (Brick & Hasson, 2018).

However, decades of over-fishing, and other factors such as habitat destruction and climate change, has led to numerous stock species collapsing, while others are considered over-exploited (DEFF, No date; Jarre, et al., 2018). Traditional methods of monitoring and management of fish species have been inadequate and regulations are often difficult to enforce effectively (DFFE; SANBI; NDP2030, No date). Jarre, et al. (2018) raise concerns about the sustainability of the industry, noting that Cape hakes, sardines, west coast rock lobsters, and the squid-jig sector are all in decline while important stocks, such as red steenbras, silver kob and geelbek, are in a dire condition (FAO, 2018; Jarre, et al., 2018; WWF; DFFE, 2021). Despite this, the TAC restriction is having a positive impact on some important fish stocks, such as carpenter and slinger, which are beginning to recover (WWF-SA, 2016).

Seabirds

South Africa has a high diversity of seabirds due to the unique and dynamic ocean environment. 132 species of seabirds have been recorded in South Africa, of which 12 species are endemic (DFFE; SANBI; NDP2030, No date). Seabirds include terns, albatrosses, penguins, skuas, gannets, boobies, gulls, cormorants, shearwaters, storm petrels and frigatebirds (DFFE; SANBI; NDP2030, No date). However, similarly to the fish, the number of seabirds is in decline with some species being listed as endangered by the IUCN (Evans, 2021). For example, the penguin breeding population has been reduced substantially and at the beginning of 2021, nearly 1,700 endangered Cape cormorant chicks were rescued from Robben Island after being abandoned by their parents (Evans, 2021). Conservation organisations have said that the biggest threat to the African penguin is lack of prey availability – specifically small pelagic fish species – that have declined due to fishing and environmental variation (Evans, 2021). The conservation organisations have called for a ban on fishing within a 20km radius of the major seabird colonies while the South African Pelagic Fishing Industry Association (Sapfia) does not support a ban (Evans, 2021).

Commercial Fishing Businesses (Fisheries)

South Africa has two fisheries sector components: wild capture fisheries and aquaculture. The aquaculture sector is being prioritised due to declining fish populations. Most fishing activities are concentrated in the Western Cape. Most of the ports, processing factories and service industries are found there. Value-added activities

take place through fish processing factories and fishery-related services, such as the provision of vessels and fishing equipment, diving services, packaging, cold storage, electronics, engineering, and clothing (Kaiser Associates 2012 as cited in Brick & Hasson, 2018). It is estimated that these services contribute over 5% of the province's GDP (Brick & Hasson, 2018; FAO, 2018). The squid industry is the exception, as the industry is concentrated in the Eastern Cape where it provides income and employment for many fisherfolk (FAO, 2018). In 2016, the DEFF estimated that 3000 people worked in the squid industry, which generates as much as \$50 million in revenue per year (Department of Environment, 2016). Brick & Hasson (2018) illustrate that the fishing industry does not exist in isolation but has multiple backward and forward linkages with other sectors of the economy. Their multiplier analysis shows that for every R1 in exogenous demand for fishery products, an additional R1.60 is generated in output through these interconnecting linkages which further translates into a net increase in domestic household income of R0.70 within fishing communities. A 2008 study by the Bureau for Economic Research (BER), reported in a presentation by Lallemand et al. (2008), provides an employment multiplier for the fishery sector of 10.7, meaning that any increase in fishery revenue of R1 million would be associated with an extra 10.7 jobs in the fishery sector and wider economy while the Institute of Economic Justice places the employment multiplier of the fishery sector at 10.8 jobs. Thus, a loss in fishery production would result in a decline in employment (Brick & Hasson, 2018).

The South African commercial fishing sector is estimated to be worth between \$6 to \$8 million annually and produces an average of 600,000 tonnes of fish per annum (Brick & Hasson, 2018; WWF-SA, 2016). In 2015, the export of fish products generated approximately R5,099 million, rising to R8,713 million by 2017 (FAO, 2018; Brick & Hasson, 2018). Direct employment across all commercial fishing sectors is estimated to be 27,000, while indirect employment in industries linked to the fishing sector is estimated to be between 81,000 –100,000 (Brick & Hasson, 2018). The South African fishing industry is capital intensive, with the value of insured assets in 2012 being R76.7 billion in the deep-sea trawl sector, R12 billion in the inshore-trawl sector, and R2.2 billion in the small-pelagic sector.

Small-scale Fishers (Fishers)

Although small-scale and subsistence fishers are formally recognised through the Subsistence Fisheries Policy, many communities were dispossessed of their lands and access to marine resources during Apartheid (DEFF, No date; Gwebani, 2021) This legacy continues as marine resources and fisheries access continue to be linked to past and corporate interests rather than taking small-scale fishing communities into account. For example, in the early 1990s, in an effort to transform the coastal fishing industry, the post-apartheid government tried to create a more equitable licensing and catch quota

scheme (Gwebani, 2021; Global Initiative Against Transnational Organized Crime, 2021). However, these quota schemes favoured commercial fishing operators and marginalised local operators who had relied on small-scale fishing for their livelihoods (Global Initiative Against Transnational Organized Crime, 2021).

These fishers use simple technology, labour intensive catch methods and low capital equipment (Sowman 2006 as cited in Brick & Hasson, 2018). Research by DAFF in 2010 estimated that there are 147 fishing communities in South Africa, within which 29,233 people are considered subsistence fishers. Some 53% of traditional fishing communities' country-wide are classified as poor and food insecure (spending between 66% and 89% of their income on food) (DEFF, No date; Brick & Hasson, 2018; Jarre, et al., 2018). The main harvesting methods are intertidal collection, beach and seine nets, and line fishing. In West Coast communities, near-shore harvesting from boats is also undertaken. In addition to fish, rock lobster, abalone and bait organisms are also harvested (Brick & Hasson, 2018).

A 2000 Department of Environmental Affairs and Tourism study, which needs updating, estimated the total value of subsistence fishing to be around \$1.6 million, with the vast majority coming from line fishing (Hara et al. 2008: 52; Brick & Hasson, 2018). While small-scale fishing contributes little to South Africa's GDP, the importance of this sector is in its provision of employment and food security – particularly protein – to poor coastal communities (Isaacs and Hara 2015).

After fishing quotas favoured commercial fisheries, state authority was delegitimised as fishers began to operate “outside the confines of a system they saw as being both corrupt and prejudiced”, which resulted in an increase in poaching (Global Initiative Against Transnational Organized Crime, 2021).

Conservation and Environmental Organisations

There are numerous conservation and environmental organisations focused on protecting the oceans or ocean biodiversity. Many of these organisations aim to bring about social justice and are not solely focused on environmental issues. These include the World-Wide Fund for Nature (WWF), Birdlife South Africa, the Southern African Foundation for the Conservation of Coastal Birds; Oceans not Oil, Sustainable Seas Trust, The Green Connection, Fish for Life, Two Oceans Aquarium, South African Association for Marine Biological Research (SAAMBR), Dyer Island Conservation Trust, WildOceans, ORCA Foundation.

The State

The South African Government is represented by the Department of Forestry, Fisheries and Environment (DFFE) and is tasked with managing the sustainable use of marine and coastal resources, maximising the economic potential of the fisheries sector, and protecting the integrity and quality of the country's marine and coastal ecosystems. All Marine Protected Areas are overseen by DFFE who have agreements with various MPA Management Authorities like South African National Parks (SANParks), CapeNature, Eastern Cape Parks and Tourism Agency (ECPTA), KZN Wildlife, Nelson Mandela Bay Metro (NMBM) and the City of Cape Town (CoCT).

4. Applying Ostrom's Core Design principles to the shared management of South Africa's oceans

Defining the Actors' Interests and Goals

The path to the shared management of the ocean ecology must begin with the enumeration of the interests and goals of the individual actors involved in the context of South Africa's oceans. We organise these actors according to three categories: firstly, the actors who derive direct economic benefit from activities conducted in coastal areas and the oceans; second are the actors that are concerned with maximising collective interests; and the third are the actors who are beyond the human sphere and comprise the natural ecology.

The first category of actors includes the commercial fishing businesses, small-scale local fishers, and nature-based tourism operators. There is a key difference in their interests, however. Commercial businesses are driven by the economic objective of profit maximisation in order to satisfy the expectations of their owners and shareholders. While pursuing increased fish catch and thereby higher revenues in the short run, in the long run they may be expected to seek higher fishing quotas and access to larger fishing areas, have a stable business model with high growth potential, increase their market share within the fishing industry and reduce operating costs through the incorporation of better technology. Their institutional expectations may correspondingly involve obtaining protection from international competition, minimal environmental regulations with low-cost compliance requirements and allocation, and enforcement of fishing rights. The interests of the supporting industry around commercial fishing such as ports, equipment providers and food processors, can be expected to alight with a flourishing commercial shipping industry. Small-scale fishers on the other hand wish to protect their way of life and achieve sustainable livelihoods. As a result, they may aim to achieve enduring food security and stable incomes in the short run and may aspire to

increase their activities in the long term to satisfy their ambitions and achieve prosperity. Thus, they may expect the institutions to increase their share of the fishing quotas, restrict commercial fishing, give them priority over dwindling fishing stocks and compensate them in case fishing activity is restricted in their ocean territory. Nature-based tourism operators are in direct conflict with the fishing economy as their business depends on the perception of a relatively pristine view of oceans by their prospective customers. Their profit-oriented goals call for a restriction on fishing activity particularly by commercial fishing businesses, and possibly having exclusive rights to stretches of protected and thriving ocean territories. In the long run they might even expect that institutions regulate their industry to control competition through licenses and declare long-term fishing free ocean territories. Other commercial actors such as companies operating in the areas of international shipping, ocean mining and resource attraction, and passenger transport and cruises, similarly compete with the fishing industry to have parts of the ocean dedicated to their industries such as through the creation of dedicated shipping lanes, mining/oil and gas licenses, or passenger shipping routes. Their long-term goals involve ensuring that their industries continue to flourish and with access to greater resources their bottom lines continue to expand.

The second category of actors that deal with maximising collective interests include environmental organisations, local communities, and the state. Environmental organisations aim to conserve nature and ensure social and intergenerational justice, and pursue these goals through research activities, advocacy, activism and providing expert solutions to environmental problems. They intend to educate people and mitigate the damage to the environment as a result of human activity, and in the long-run aim for collective goals such as shaping a free and equitable society, preserving ocean biodiversity, and providing clean air and oceans to present and future generations. The second type of actors comprise the local coastal communities and they focus on different collective goals. Similar to environmental organisations they seek healthy air and oceans with thriving biodiversity to ensure the health and wellbeing of the community. However, economic sustenance is a key priority for the local communities, and they would prefer that different ocean-related economic activities, such as small-scale fishing, nature-based tourism, port activities, trade and markets, continue to be protected and monitored to ensure their ongoing survival and the overall prosperity of the community. The third actor that falls in this category is the larger state comprising national and provincial governments whose activities in the context of the oceans include regulation of the blue ocean economy and the creation of marine protected areas. Their overarching collective goal is economic growth and international trade. Their actions intend to balance the interests of various actors and the short run focus is to attain food security for the population, generate jobs, create wealth within the country, ensure political support from communities and obtain economic support from the

industry. Their long-term goals include achieving sustained levels of high economic growth, amassing power within geo-political groupings, increased fiscal strength and, in the current context, to increase resilience to the impacts of climate change.

The third category of actors comprise the non-human beings such as fish and seabirds that exist within the ocean ecosystem and the ocean itself! While it may be difficult to determine with accuracy the interests and goals of these actors, it is possible to make assertions based on common ecological and socio-cultural values. Thus, in the short-term the goals of fish, marine animals and sea-birds may include ensuring their continued existence and the existence of life-supporting living conditions, and in the long-term these may comprise stability of ocean food-chains, a high reproductive capacity and strong populations, unhindered access to ocean territories and an equal right to the ocean as humans. From a human perspective, some of these objectives may coincide with objectives to conserve nature and maintain biodiversity and understand reproductive cycles and conditions that lead to population growth. Many cultures and societies recognise the oceans as spiritual and sentient beings. Such an entity may have as its objectives the maintenance of its ability to recuperate, regenerate and evolve, balance ocean acidification and maintain clean waters, and support healthy biodiversity. Thus the goals with regards to the ocean involve recognition of the rights of the ocean, reducing pollution, providing a healthy environment for species that recognise the ocean as their home and maintaining a healthy symbiotic relationship with the human species. These may be expanded in the long run to include providing the ocean with rights on par with humans, maintaining global geophysical processes by combating climate change, cultivating balanced ocean ecosystems and restoring the balance between human and non-human species.

Applying Ostrom's Design Principles

Considering the interests of the human and non-human actors, it is quite clear that there are conflicts in the pursuits of their respective goals. Market and state-based mechanisms have been unable to balance the interests of these actors and have ended up favouring one over the other. This is evident in the form of the challenges faced by small-scale fishers and the environmental degradation of ocean ecosystems. Commons-based approach offers an alternative governing mechanism where the interests of the actors are accommodated through inclusive processes of self-organisation rather than state enforcement or market economics. By considering the non-human actors and their relationships with human actors allows the common to transcend the narrow conception of a resource-oriented approach and may lead to an effective marine protection management mechanism. Below we engage in an exploratory exercise in examining what the process of commoning would look like in the

case of the oceans management in South Africa. The principles suggested by Ostrom can be used as a guide towards the establishment of an effective ocean commons governance.

The first principle per Ostrom is to have clearly defined boundaries so that the actors may understand their rights regarding the resource in question. Understanding the relationships between different actors is key to this process. These relationships help the actors to form a collective group under a shared purpose and enable the common to acquire an identity. Having examined the objectives and goals of the various actors, we may thus infer that objectives, such as having healthy seas, maintaining ocean biodiversity, creating viable and growing fish stocks, continued human activity in the oceans and supporting the diversity of human activity, may form the basis for creation of a common charter that serves as a guiding set of objectives for the creation and functioning of the ocean common. The set of permitted behaviours and the boundaries of actor behaviour may then derive from these objectives that the common identifies.

The second principle concerns the consistency between appropriation and provision rules which may ensure an equitable distribution of rights and responsibilities among the actors. In this case, the existing fishing quotas thus need to be reformed under the commons principles and for collective interest to ensure, for instance, that small-scale fishers and local communities obtain sustained livelihoods. Other arrangements may include defining the timing of fishing activity to enable nature-based tourism to continue unimpeded, examining the technology used by commercial fishing businesses to ensure the survival of non-farmed fish or using the expertise of environmental organisations to conduct activities that increase the reproductive rate of farmed fish. These arrangements need to consider the rights of non-human actors and thus a framework of marine protected areas needs to be adopted and other rights need to operate within this framework such as any international trade ambitions and targets.

The only way that such limitations may be accepted by all actors is through collective choice arrangements that form the third principle. The decision making needs to be consensus-based ensuring the inclusion of all voices without judgement so that the outcomes are considered fair. The long-term goals of the common are the foundation of this process and while the decision-making process may be messy and require many iterations to reach an outcome, the process needs to be perceived to be inclusive and equitable. Through a process of collective decision-making, however, emergency procedures and tribes may be established ex ante to deal with time-critical events. A local pollution event may be such a case where time is of the essence to warrant actions taken without collective approval utilising a tribe composed of environmental

institutions, local communities, fishing businesses and others. Such a limited delegation of power, if agreed in advance, is compatible with design principles.

Any collective choice arrangement will prove to be meaningless, in reality, without the existence of well-defined monitoring arrangements (the fourth principle) at regular time intervals of different scales. The monitoring must be linked with the agreed rules of behaviour for achieving the goals of the common. Monitoring exercises may also lead to the progressive identification of behaviours that may be collectively deemed to be violating the agreed purposes of the common. Neutral expert actors such as environmental organisations as well as local communities and port workers are key to the monitoring process from ensuring the health of fishing stocks, monitoring pollution in the oceans, to the confirmation of the use of fishing quotas by monitoring the size of the catch. Due to a lack of hierarchical structure all actors may undertake the task of monitoring the state of the common and adherence to agreed behaviours.

Such a well-defined monitoring arrangement needs to lead to a well understood system of graduated sanctions, which is the fifth principle. Any violation by an actor needs to be examined by their peers in the common and based on the intent and severity of the violation a sanction needs to be applied. Again, the framework of sanctions needs to be agreed upon collectively in an inclusive fashion considering the damages to both human and non-human actors. A principle of redressal of the damage caused may be applied, if possible, such as undertaking cleanup in the event of a pollution event, and any voluntary measures taken to avoid future digressions may be considered in lieu of sanctions, such as technological changes and improved fishing methods. In their absence to have a defined say in the process the rights of the non-human actors need to be defended by other members of the collective. It may also be useful to recognize any helpful efforts made by an actor towards the cause of the common's goals.

It is important to establish mechanisms and procedures for quick and fair resolution of conflicts (sixth principle) that may arise. Any conflict that emerges during the course of pursuing the activities of the common needs to be addressed through these established procedures. Conflicts need not be viewed in a negative light but considered to be a healthy function for the operation of the common. Such conflict resolution mechanisms may also involve the participation of other commons which may provide an unbiased and objective assessment or through the establishment of expert councils for specific areas recruited from within the members of the common. It may be possible to make use of external arbitrators and judicial institutions, particularly as they relate to the adherence to environmental law, in specific situations. However, the commons need to view the conflict resolution process as broadly an endogenous process rather than an external recourse.

The right to self-organise within the framework of commons must be recognized (seventh principle) without imposing an external institutional structure. At the same time, it needs to be understood that previously agreed purposes, rights, rules, and procedures, may be changed at any point through the process of collective decision-making. For instance, if the existing agreed-upon behaviours do not lead to sufficient improvement in the state of the oceans and fish stocks, meaning that the needs of these non-human actors are not being met in the current state, then the common needs to reassess and reorganize to meet the agreed upon goals of the common. Such a complex adaptation is to be recognised as integral to the effective functioning of the common and its capacity to respond to the changing environment such as that which might come about due to the impacts of global climate change. Any power structures created within the common are to be viewed as transient. This right to self-organise and govern must be recognised as part of the law of the land and any legal structures created to protect the oceans has to be conducive to the operation of the common. For instance, when the common functions in a way to recognize the right of the ocean and its non-human life as much as a human being, the law of the land must be amenable to grant these rights in its own structures.

Individual ocean commons may arise in different parts of South Africa that may need to function in a collaborative manner with overlapping areas of operation that are governed collectively. Thus, at an overall level the oceans of South Africa may have a polycentric structure of oceans governance (eighth principle) with individual ocean commons deciding what is the best approach to be taken to achieve their goals and collectively the commons work together to achieve the global goals of healthy ocean environments. They may have collective procedures to deal with large challenges which may be beyond the capacity of a single common to address. Even non-ocean commons may play a role in supporting ocean commons. For instance, trade commons may assist the ocean commons in monitoring the quantity of fish sold through its networks. At a national level, the state may function as a coordinating entity as it may itself be part of multiple commons communities. And conversely, the various commons working together may form the structure of oceans governance at the national level and may be able to accommodate national priorities through their polycentric governance of the oceans.

5. Conclusion

Based on the case study exploration using the Commons theory in the context of South Africa's MPA management practice, as well as our group discussions and concept elaborations, we conclude that using Ostrom's design principles could help to address

some key challenges of how to set up and sustain a more successful 'commoning' MPA management practice. By discussing the very infrastructures of how to establish successful modes of cooperation amongst diverse actors with fundamentally different interests, our hypothesis is that Ostrom's principles can assist to set up a more equitable, inclusive and therefore potentially effective way of working across stakeholder groups, taking short as well as necessary sustainable long term goals into account. However, in practical terms, the application of the design principles remains untested in this context. We therefore recommend applying them to future MPA management practices in the South African territory as a way to observe and assess their effectiveness in terms of creating self-sustaining and highly cooperative MPAs that normalise a plurality of stakeholders, human and non-human, as a means to sustain South Africa's oceans and biodiversity for the long term.

References

Brick, K. & Hasson, R., 2018. Valuing the Socio-Economic Contribution of Fisheries and Other Marine Uses in South Africa, Cape Town: Safeguard our Seabed Coalition.

Chadema, S. & Joseph, C., 2017. Phakisa is a regressive step against Climate Change Policy gains in South Africa. [Online] [Accessed 9 February 2021].

DEFF, No date. Chapter 9: Oceans and Coasts, s.l.: Environment.gov.

Department of Environment, Forestry and Fisheries (DEFF), 2019. Operation Phakisa - Oceans Economy. [Online] Available at: <https://www.environment.gov.za/projectsprogrammes/operationphakisa/oceanseconomy#introduction> [Accessed 10 February 2021].

Department of Environment, F. a. F., 2016. Status of the South African Marine Fishery Resources, s.l.: South African Government.

Department of Planning, Monitoring and Evaluation (DPME), 2014. Operation Phakisa. [Online] Available at: <https://www.operationphakisa.gov.za/Pages/Home.aspx> [Accessed 9 February 2021].

DFFE; SANBI; NDP2030, No date. Marine Protected Areas South Africa. [Online] Available at: <https://www.marineprotectedareas.org.za/> [Accessed 7 August 2021].

Evans, J., 2021. Decision time: Will Barbara Creecy put an end to fishing around dwindling penguin colonies?. [Online] Available at: <https://www.dailymaverick.co.za/article/2021-07-27-decision-time-will-barbara-creecy-put-an-end-to-fishing-around-dwindling-penguin-colonies/> [Accessed 1 August 2021].

FAO, 2018. Fishery and Aquaculture Country Profiles: South Africa. [Online] Available at: <http://www.fao.org/fishery/facp/ZAF/en> [Accessed 2 February 2021].

Global Initiative Against Transnational Organized Crime, 2021. The abalone connection: The ties that bind poaching and smuggling with the SA crystal meth industry. [Online] Available at:
<https://www.dailymaverick.co.za/article/2021-05-02-the-abalone-connection-the-ties-that-bind-poaching-and-smuggling-with-the-sa-crystal-meth-industry/>
[Accessed 20 August 2021].

Gwebani, S., 2021. Marine protected areas must promote and respect rights of small-scale fishers, not dispossess them. [Online] Available at:
<https://www.dailymaverick.co.za/opinionista/2021-08-11-marine-protected-areas-must-promote-and-respect-rights-of-small-scale-fishers-not-dispossess-them/>
[Accessed 17 August 2021].

Jarre, A. et al., 2018. Untangling a Gordian knot that must not be cut: Social-ecological systems research for management of southern Benguela fisheries. *Journal of Marine Systems*, 01(004).

Naidoo, A., 2020. *Ocean Governance in South Africa: Policy and Implementation*. s.l.:s.n.

Thornton, S., 2021. Marine protected areas become more than ‘paper parks’ with improved management. [Online] Available at:
<https://www.dailymaverick.co.za/article/2021-04-11-marine-protected-areas-become-more-than-paper-parks-with-improved-management/>
[Accessed 7 August 2021].

WWF; DFFE, 2021. MPA Forum. [Online] Available at: <http://mpaforum.org.za/>
[Accessed 19 August 2021].

WWF-SA, 2016. *Oceans facts and futures: Valuing South Africa's ocean economy*, Cape Town: WWF-SA.

WOR (2015). “Chapter 2: How the seas serve us”. In: *World Ocean Review 4: Sustainable Use of Our Oceans – Making Ideas Work*. Available at:
https://worldoceanreview.com/wp-content/downloads/wor4/WOR4_en_chapter_2.pdf