

Conserving the Great Blue

Overturning the Dominant Ocean Paradigm

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Conserving the Great Blue

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The Great Blue is an extraordinary world of water – our seas and oceans – spectacular in their beauty, in their mystery and their power. The diversity of marine life is almost beyond comprehension, amounting to 80 per cent of all plants and animals. The sea is bountiful and benevolent, regulating planetary systems, giving us foods, energy, minerals and medicines, and making life on Earth possible. For many, it is also a fount of inspiration and spirituality.

Even so, we treat this astonishing kingdom as an inexhaustible supply of resources and a dumping ground for our wastes. Excess carbon dioxide emissions are also causing waters to become more acidic, seriously harming many forms of sea life.

Imagine a very different scenario; where ocean conservation takes precedence over careless exploitation and using the oceans' resources respectfully becomes the prevailing norm.

Marine governance can be transformed, so that seas and oceans are valued and respected as they should be, as a shared heritage for humankind. They would be healthy and unpolluted with clear waters full of life. They would yield a never-ending supply of food and renewable resources, and provide employment for millions of people.

The following pages describe how to practically achieve that attainable goal: how to protect the world's seas, how to restore them and how to replenish them.

Introduction

The rapid deterioration of the world's seas calls for a comprehensive shift in reasoning, and a fundamental change of management and practice. Their worsening condition shows that the prevailing system of ocean governance needs radical reform.

The evidence is unequivocal. Many species are on the verge of extinction due to commercial fishing, pollution and ocean acidification. Millions of birds and mammals are killed by nets, lines and debris of all kinds. Plastic waste has been found in the remotest and the deepest places of the global ocean. Coral reefs are trashed by fishing gear and weakened by global warming. Mining, oil and fishing companies are making excessive profits whilst impoverishing coastal communities. Industry is getting away with blue murder, and on a vast scale.

If the prevailing system isn't working, the thinking behind it isn't working either.

When the well-being of the sea comes first, commercial use would be permitted only when it is non-damaging and sustainable. Industry would no longer have the right to ransack. Misuse would be a criminal act.

Suppose those in power were forced, by scientific evidence and public pressure, to redefine their thinking and revolutionise their approach to our ocean planet. Governments would work together and take decisive action to tackle these solvable problems. They would become accountable to the people they represent, who want clean and vibrant seas. The health of the marine environment would then always take priority over selfish interests and profit-making at any cost. Imagine over-fishing and destructive mining becoming a thing of the past; pollution and plastic waste diminishing and eventually disappearing; and wildlife flourishing – in coastal waters, ocean depths and on the high seas.

Back-to-front world

For decades, scientists, journalists and campaigners have been alerting us to the declining state of oceans the world over. There is a mountain of evidence on the scale and scope of the damage, waste and cruelty inflicted upon the sea and its wildlife. Many observers consider that over-fishing has the most devastating impact, with a global tally of 4.6 million fishing vessels chasing after fewer and fewer fish. There are also newer threats to marine environments and humankind alike, including the rapid expansion of deep-sea mining, the widespread dispersal of plastics and other toxins, and slavery in the fishing industry. But ocean acidification is emerging as potentially the greatest problem of all (see Appendix 1).

And yet governments tend to turn a blind eye to the crisis and generally disregard the scientific advice on dealing with it. They immerse themselves in relatively minor concerns of the day, and are frequently beholden to business and industry. Several even exacerbate the problems with millions of dollars of subsidies to fund industrial fishing and other destructive activities.

Most of us undervalue the oceans' critical role and don't realise that they also sustain life on land. They absorb vast amounts of carbon dioxide from the atmosphere (more than that taken up by all the plants and forests on land). Phytoplankton living in the sea generate up to 85 per cent of Earth's oxygen, thereby producing the air we breathe. Ocean currents regulate the world's climate. They distribute the sun's heat, moderating otherwise extreme temperatures.

Around 90 per cent of all trade is carried by sea. As markets have become globalised, the volume of goods shipped has soared. Shipping is the keystone of international trade and the global economy, connecting nations and peoples across the world. But the industry produces a significant amount of pollution and waste.

The sea is delivering life-saving treatments. Lesser known marine organisms have properties with enormous medicinal value. Some are being developed for new types of drugs to combat cancer, HIV and malaria. These organisms promise to be the most productive source of a new breed of anti-biotics, which is desperately needed as we build up resistance to those commonly used today.

Fish is the main source of protein for one billion people. While 180 million are directly or indirectly employed in fisheries, mostly in the developing world.

So, as we still describe ourselves as the most intelligent of species, how do we rescue and restore our ocean heritage? How do we stop killing the proverbial goose that lays the golden egg?

The solution is in seeing that we are a part of nature, and not something separate. Though we may not live in the ocean, we are inherently connected. Industrialisation has left us distant from the natural world.

In today's back-to-front world, those trying to safeguard the world's oceans struggle to do so. The onus is on the conservationist to justify protecting a critical global resource, even though sound seas sustain us all. Whilst those who empty them, pollute them and profit from them, do so regularly unchallenged and uncontrolled.

Logic says it should be the other way around – that the out-dated but dominant paradigm is turned on its head. All seas and oceans would then be protected from harm, and not just parts of them in protected areas. This would drive essential change in the way we use marine resources. We should *expect* seas to be unspoilt and unpolluted. We should *assume* that marine life is properly valued. Accountability and responsibility would then pass from the defender to the exploiter. The precedence of nature would be restored.

With this shift in our understanding, the integrity and health of the marine environment would be given primacy in law. All

marine industries would be strictly regulated, compelling those who use the sea to ensure that their activity is neither harmful nor unsustainable – whether it is fishing, aquaculture, dredging, mining, oil and gas extraction, shipping or recreation. Damaging land-based activities would also be addressed, such as excessive fossil fuel emissions and the proliferation of plastic waste and other contaminants. Marine ecocide would cease.¹

Presently, excessive cost is the most common excuse for not taking such protective action, even though intelligent use of the sea reaps significant financial rewards.² And, perhaps more surprising, the concept of protecting the entire marine world is not a mere idealistic prospect – not when you consider that, in theory, our seas and oceans are already protected by international law.

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¹ Ecocide, or a 'law for life', describes extensive damage to the natural environment or loss of an ecosystem, principally due to human activity. Until her death in 2019, lawyer Polly Higgins led the campaign to include ecocide as the Rome Statute's 5th international Crime Against Peace. <https://www.stopecocide.earth>

² <http://www.neweconomics.org/publications/entry/sustainable-fisheries-make-economic-sense>

Current approaches

The major problems facing the sea are complex and wide-ranging.

To detail all the aspects of the crisis would require a book in itself, but the major issues are outlined in Appendix 1. The concern in this pamphlet is less with describing the problems and much more with the way to deal with them. One thing is clear: the problem is not a lack of money, knowledge or capacity to manage the human impacts upon the sea wisely. It is the lack of political will to act for the good of the global community.

Multilateral agreements

The current way of managing the world's oceans and seas reflects how we consider our world: divided and sub-divided, classified, codified, compartmentalised and lacking in cohesion or perspective.

We can't help chopping up the world into different categories, departments, disciplines, specialisms, sections and sub-sections, neatly separating the elements of the natural environment as though they are unconnected and unrelated. A fragmented view ends with a fragmented response.

The result is a grand assortment of confusing declarations and recommendations, of treaties and resolutions, of multinational bodies and international authorities. This approach is splintered. It is reactive and it doesn't adequately safeguard the sea.

Authorities become aware of environmental problems as isolated concerns, only after the damage is done. They then react to each problem with a new policy or regulation, which is often too weak and usually too late to effect a remedy. The counter approach is to be proactive and pre-emptive, and to see the environment as one elaborate system whose parts are interlinked and inseparable.

The processes of the natural world, its wildlife and its beauty, should be secured as a given. Humankind cannot 'manage' Earth's chemical and biological systems: they do that unaided. Instead we must learn to manage our expectations and our activities in a way that doesn't diminish or destroy nature's largesse.

Over the past 50 years there have been over 500 international agreements on the environment, ranging from protecting the ozone layer and Antarctica's ice, sharing genetic resources and reducing over-fishing.

A lack of co-ordination between various international agreements and organisations has led to overlaps, gaps, missed targets and poor compliance. Meanwhile ecosystems continue to decline, and global warming and climate change accelerate.

We now have 'treaty congestion' according to the UN Environment Programme. Some may consider there is also a considerable measure of 'treaty inscrutability' and 'treaty blindness'. For example, ocean acidification is not dealt with specifically in any international agreement and remains legally outcast.

Regional Fisheries Management Organisations (RFMOs)

Worldwide there are 38 regional fishery bodies: 20 advisory bodies and 18 RFMOs. Some manage the stocks of specific species (such as the International Whaling Commission and the Indian Ocean Tuna Commission) and others have a broader scope, managing all commercial species within their region (such as the North-East Atlantic Fisheries Commission).

The RFMOs are charged by the United Nations Law of the Sea with managing fish resources sustainably, and co-operating efficiently in that objective with other RFMOs. Despite this, in 2012, 67 per cent of stocks under RFMO management were recorded as depleted or over-fished (32 out of 48).³

³ S. Cullis-Suzuki and D. Pauly, *A Global Evaluation of Regional Fisheries Management Organisations*, 2010

Furthermore, RFMOs do not cover the entire sea, and therefore large areas remain unmanaged and vulnerable to excessive exploitation, i.e. illegal, unreported and unregulated fishing (IUU). For instance, most of the high seas, including large parts of the Pacific, Indian and much of the Atlantic Oceans, are not covered by an RFMO with the authority to manage deep-sea fishing. Harmful bottom trawling in these regions is therefore largely unregulated.

Marine reserves

Existing international law has not protected oceans and seas as intended. Consequently, conservation organisations are campaigning to establish marine reserves to prohibit fishing, mining and dredging in especially rich or vulnerable areas. When left undisturbed, habitats can recover and depleted populations of marine life flourish.

With time to mature and breed, all sea life becomes more numerous and prolific. The recovery of ecosystems and species populations can be remarkable. Examples include the number of yellowtail snappers increasing by 15 times only four years after founding a reserve in Florida; and scallops increased 25 fold after nine years of protection in a New England fishery.⁴ The upsurge of life spilling over the reserve boundary also boosts the catch of local fisheries.

Non-governmental organisations (NGOs), charities and pressure groups such as Global Ocean Legacy and Greenpeace are stepping in where governments have failed and many are campaigning to establish marine reserves around the world.

However, the process of establishing a reserve is long and involved. It can take years of negotiations and compromises between parties, with those wishing to preserve precious species and habitats versus those who wish to exploit them.

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⁴ C. Roberts, *Oceans of Life*, 2012

There is always a spell between identifying a vulnerable or especially rich area of sea, and jumping the bureaucratic hurdles to protect it. The delay can even accelerate the damage.

This is illustrated by the case of the Darwin Mounds, a deep-sea coral reef off the coast of Scotland, where the announcement of its forthcoming closure meant that, for some time, destructive trawling there increased.

There are thousands of areas of sea with some degree of protection around the world, but many are too small and fragmented to be very effective. Indeed the very nature of water, its mobility and fluidity, makes it incongruous to apply our land-based ideas, our 'fencing off' mentality, to the sea. For instance, top predators such as swordfish, tuna and shark are urgently in need of protection, but they swim over vast distances during their lives, way beyond a neat circle drawn on the map in a departmental office hundreds of kilometres away.

There are also several major concerns which protected areas cannot address, crucially pollution and ocean acidification. And despite all the benefits, they cover less than 5 per cent of the world's seas.

Not to diminish the efforts made in the creation of reserves, nor to underestimate their enormous conservational value, even if the WWF's target of 30 per cent protection by 2030 is achieved that will still leave 70 per cent of the oceans vulnerable and at the mercy of commercial over-exploitation, acidification and other forms of pollution.

If the current paradigm were reversed, there would be no need for marine reserves. With all seas and oceans protected as the default position, there would instead be 'marine industry zones' – areas of responsible commercial activity, which preserve clean, healthy and vibrant waters. Consequently all oceans would effectively become one entire reserve, safe from damaging practices and over-exploitation.

Marine conservation initiatives

There are many excellent campaigns and projects around the world led by inter-governmental bodies, NGOs and charities. They include the international and broadly-based, like the UN's Oceans Compact and Regional Seas Programme, plus the work of big charities such as Pew Environment, Oceana, Greenpeace and Conservation International, and smaller pressure groups such as Black Fish (theblackfish.org) and Bite-Back (bite-back.com).

There are also locally-led community initiatives all over the world, such as Velondriake in Madagascar (velondriake.com). There are coalitions such as Seas at Risk (seas-at-risk.org) and the Deep Sea Conservation Coalition (savethehighseas.org) and the only organisation currently attempting to enforce international law on the high seas, Sea Shepherd (seashepherd.org).

The combined knowledge and expertise of those working in the conservation organisations can provide all the solutions to the problems the oceans face, if only they had the necessary political support. This massive resource of commitment and knowledge could be harnessed and united to generate a new impetus for a law that effectively protects the whole sea. In fact, such a legal framework already exists, at least in parts. The parts only need to be put together and modernised.

International law protecting the marine environment

Treaty congestion apart, there are particular international agreements that do provide the leverage in law to upturn the prevailing principles of (the lack of) ocean management. This isn't an unattainable concept, or a wide-eyed notion. We're not starting from scratch. The basis of a legal structure to protect all our seas and oceans is already in place.

Treaty law

The **United Nations Convention on the Law of the Sea** (UNCLOS), commonly referred to as the Law of the Sea, is the primary mechanism for governing the marine environment. It is a complicated international agreement, negotiated between 1973 and 1982, which came into force in 1994 with over 160 countries participating.

All aspects of our use of the sea are addressed, including military activities, international commerce, shipping regulations, territorial zones and marine conservation.

By balancing sovereignty, exclusive jurisdiction and high seas freedoms, the Law of the Sea established a comprehensive regulatory structure that has helped pre-empt conflict between nations and contributed enormously to global peace.

Specifically on the issue of conservation, the Law obliges States to conserve the marine environment within their own waters and in the high seas (areas beyond national jurisdiction) through multi-lateral co-operation:

States have the obligation to protect and preserve the marine environment.

States shall take ... all measures ... necessary to prevent,

reduce and control pollution of the marine environment from any source ... The measures shall include those necessary to protect and preserve rare or fragile ecosystems as well as the habitat of depleted, threatened or endangered species and other forms of marine life. (Articles 192 &194)

States shall cooperate on a global basis ... for the protection and preservation of the marine environment. (Article 197)

The coastal State, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation. As appropriate, the coastal State and competent international organisations, whether subregional, regional or global, shall cooperate to this end. (Article 61 (2))

As an amendment to the Law of the Sea, a new UN High Seas Treaty is currently being negotiated to conserve the living resources of the high seas (also called biodiversity beyond national jurisdiction, or BBNJ) . The process is expected to be completed in 2020.

The new treaty aims to ease the creation of protected areas and marine reserves; to make environmental impact assessments mandatory before allowing a range of potentially damaging activities; and to help developing countries play a greater part in marine science and conservation (known as capacity building). Another objective is to ensure a fairer distribution between richer and poorer nations of the commercial benefits of products derived from the sea, for example, in cosmetic and medicinal products.

But the Law of the Sea is not the only useful legal mechanism that we can draw upon to overturn the dominant paradigm. Other useful precedents exist in international law that can help build a different future for the marine world.

The **Antarctic Treaty** came into force in 1961 and currently has over 50 signatory nations. This too is a ground-breaking treaty

and an inspirational precedent. It set the bar of multinational co-operation in protecting all the land and ice shelves south of 60° S latitude and it designates the region as a de-militarised area, to be conserved and used for scientific research and for peaceful purposes only.

In 1982, the **Convention for the Conservation of Antarctic Marine Living Resources** (CCAMLR) was established as an integral component of the Antarctic Treaty in order to conserve marine life in the Southern Ocean, following serious concerns about the over-fishing of krill, which are small crustaceans that support an extensive and elaborate food-web, from whales and seals to multiple species of fish and other organisms. It is an international Commission with 25 members; ten additional countries have also acceded to it.

The Commission and its Scientific Committee helped pioneer the development of the 'ecosystem approach' to marine management which takes the entire ecosystem into account, rather than individual species, when implementing fisheries regulation (see Appendix 4).

Significantly, it also uses the precautionary approach (see Appendix 4 for definition), a critical safeguard when dealing with uncertain data and a patchy understanding of how extremely complex natural systems operate. CCAMLR allows harvesting, providing it is carried out in a 'rational' manner.

Before CCAMLR, there was an ecological catastrophe in the making as nations rushed to exploit the riches of Antarctic waters. Then came the implementation of an international agreement to avert the crisis: an agreement based specifically on the judicious management of resources, guided by scientific advice. The health of the marine environment was prioritised above all commercial interests, and secured the conservation of the Southern Ocean and its wildlife for the public good and nature's good.

The parallels are clear, between a looming disaster in the international waters of the Antarctic over 30 years ago and the critical state of world's seas today. Scale the response up to the global stage and CCAMLR can be seen as part of a working model for how co-operative political action with a progressive approach can effectively deliver a solution.

Most importantly, CCAMLR places conservation at the core of its management strategy, with commercial interests coming second.

The 1995 **United Nations Fish Stocks Agreement** (UNFSA) is a supplement to the Law of the Sea, known as an Implementing Agreement, and it came about due to the crisis of managing trans-boundary fish stocks. UNFSA has been a major step forward in establishing a modern strategy for long-term conservation of fish stocks.

In particular, it stipulates the ecosystem approach to management, taking into account the interdependencies of species.

Other provisions include:

- Fishing states are required to adopt measures to ensure long-term viability of stocks, basing measures on best available scientific evidence and taking a precautionary approach
- States have the right to monitor and inspect vessels of other state parties to verify compliance with internationally agreed fishing rules
- Measures are to be implemented through the regional fisheries management organisations (RFMOs).

The **United Nations Framework Convention on Climate Change** (UNFCCC) is an international environmental treaty negotiated at the Earth Summit in 1992; it came into force in 1994. The objective of the treaty is to 'stabilise greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'.

Ocean acidification is a climate change issue, not least because it is also caused by excess greenhouse gases in the atmosphere, notably carbon dioxide. The increased acidity of oceans makes them less able to absorb the same levels of carbon dioxide as they have done in the past, thereby diminishing their value as a carbon sink for anthropogenic emissions. It also changes the conditions that many organisms, including coral reefs, depend on for survival.

Research shows that ocean acidification accelerates global warming due to the biogenic production of the marine sulphur component, dimethylsulphide (DMS). However, the UNFCCC has yet to officially recognise ocean acidification, or incorporate it into the treaty and plan a strategy to confront it.

In 2015, Parties to the UNFCCC adopted the Paris Agreement, binding countries to take urgent action to reduce greenhouse gas emissions and aim to keep global warming to no more than 1.5 °C above pre-industrial levels. However, governments have been dragging their feet and currently the majority of parties are not on track to meet the agreed targets.

Yet despite these many political problems, the UNFCCC (like the Antarctic Treaty) has set important precedents of inter-governmental co-operation in managing the use of natural resources that can be applied to safeguarding the world's seas and oceans. For the Convention explicitly aims to prevent damaging effects on climate systems and to allow ecosystems to adapt naturally, while ensuring food security and sustainable economic development.

The emphasis is on nations acting together, and recognises that the richer nations must take the lead in curbing adverse impacts and consider the needs of both present day and future generations:

The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the

lead in combating climate change and the adverse effects thereof. (Article 3, UNFCCC)

The 1992 **Convention on Biological Diversity** (CBD) provides another useful precedent. Its purpose is to conserve the planet's biological diversity in a sustainable and equitable way. It too includes key tenets of sustainable development and embeds in law the principle that conservation of biological diversity is 'a common concern of humankind'.

The Convention covers the conservation of all ecosystems, species and genetic resources using the precautionary approach. It also recognises that in order to conserve biological diversity the financial commitment will be considerable, but that there will be significant environmental, economic and social rewards.

In 2010, in Nagoya, Japan, the 193 Parties to the CBD adopted a ten-year Strategic Plan (2010–20) detailing the 'Aichi' targets to safeguard biodiversity (including marine and coastal) and in 2015 oceans were finally given a dedicated UN Sustainable Development Goal, named Life Below Water:

SDG 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development.

These treaties all provide useful precedents for us to re-invent our approach to ocean governance. And they are not the only legal tools available to help make that happen.

Customary law

As well as treaty law, there is another type of international law which protects the sea. It is the law of tradition and common sense, known as customary law. Customary law has been evolving over decades and centuries as a code of behaviour, rather than being formulated as a set of rules agreed between delegates and lawyers at a conference.

Treaties are applicable to the contracting parties, whereas custom is binding on the whole international community (derived from a consensus of what are the norms of reasonable practice).

Although the observance of customary law depends on a State's 'tacit agreement' to do so, community pressure on individual States makes it difficult not to comply. This gives customary law the power to help kick out and eliminate a system based on profligacy and national egocentrism.

There are two aspects of international customary law which, when applied, provide the legal framework for the preservation of the marine environment.

The **Public Trust Doctrine** (PTD) states that governments must manage the use of natural resources in the interests of present and future citizens. The PTD can be traced back to Roman law which established the public's right of access to rivers, waterways, the sea and the seashore.

The doctrine has been incorporated into the constitutions and laws of several nation States, including Australia, Brazil, Canada, Ecuador, India, Kenya, Nigeria, Pakistan, the Philippines, South Africa, Sri Lanka, Tanzania, Uganda and the United States.

The Public Trust Doctrine has three simple elements:

1. Common natural resources cannot be privately owned, and instead are held within a Public Trust.
2. Governmental authorities are trustees of the Trust, and therefore assigned with its prudent management.
3. The beneficiaries of the Trust (both present and future citizens) can hold the trustees accountable for the mismanagement and degradation of the resources of the Trust.

By requiring governmental trustees to treat the interests of current and future citizens equally in their decision making about common natural resources, the PTD provides a

philosophical framework for structuring the relationship among generations of citizens, governmental bodies, and natural resources. Additionally, in States with strong PTDs, the doctrine affords citizens a broad suite of rights, including the right to access information about the status of trust resources and the right to seek judicial relief when trustees alienate their duties. Therefore, a clear Public Trust framework could contribute key accountability mechanisms to institutions charged with protecting the rights of future generations to functioning ecosystems. (M. Turnipseed et al. *The Public Trust Doctrine and Rio+20*, 2012)

The Public Trust Doctrine crystallises the need to guarantee the rights of future generations to an unimpaired natural environment which can sustain life, both within national territories and beyond in the global commons. Undervalued and underused, the PTD's key principles of wise resource management, government accountability and responsibility to future generations, provide a sound legal basis for conserving marine environments and the rest of the natural world.

The very term 'Public Trust' is a powerful one – not least because that is precisely what governments are losing through their lack of responsibility and unacceptable management of our common good resources.

The **Common Heritage of Humankind** (or the Common Heritage of Mankind) states that the global commons – areas beyond national territories such as the high seas – are humanity's common heritage and should not be exploited by individual nations or corporations but held in trust for the benefit of all and for future generations.

The concept is attributed to the former Maltese ambassador to the United Nations, Arvid Pardo. Addressing the Council of Europe in December 1970, he said, 'the time has come to recognise as a basic principle of international law the overriding common interest of mankind in the preservation of the quality of the marine

environment and in the rational and equitable development of its resources lying beyond national jurisdiction’.

Pardo proposed that all of the high seas should be reserved for peaceful purposes only, and that there should be no claims of national jurisdiction over them because they ‘belong’ to humankind as a whole. Although the Common Heritage of Humankind subsequently became integral to the Law of the Sea, during the course of negotiations, it was restricted to apply only to the seabed. It asserts:

The Area [the seabed beyond national jurisdictions] and its resources are the ‘common heritage of mankind’. (Article 136)

Activities in the Area shall ... be carried out for the benefit of mankind as a whole, irrespective of the geographical location of States ... (Article 140)

To sum up

Current statutory and customary laws already include the key elements needed to establish the paradigm of guardianship for all seas. But these elements are often misinterpreted, overlooked or dismissed by politicians, bureaucrats and industrialists. They tend to remain hidden within lists of articles and recommendations and the inaccessible language of law.

The UN Law of the Sea is certainly a milestone of multilateral collaboration in ocean management. However, it fails to protect seas and oceans adequately due to four major factors:

1. It is out of date. The Law of the Sea came into force in 1994 and was drawn up 12 years before that, and there have been many technological and commercial developments since which are not accounted for in the treaty. For example, advances in the ability of ships to track and capture fish have accelerated the demise of many species. Bioprospecting (the search for minerals and biological organisms for use

in industries such as pharmaceuticals and cosmetics) was unknown, as was ocean acidification and the global reach of plastic waste (see Appendix 1).

2. Unlike many global conventions, the Law of the Sea has no separate secretariat or compliance mechanism to ensure its implementation.
3. It is general and vague, making the law easy to evade and therefore weak in practice. For example, what precisely constitutes a breach of the law? What are the marine pollution guidelines and standards? Who is answerable for transgressions?
4. Most importantly, the Law of the Sea is not universally enforced by contracting parties and in many areas – notably the high seas – it is rarely enforced at all and is therefore generally ineffective.

The means to rescue and safeguard the sea – establish the precedence of healthy oceans over harmful practices with the reform of current law

The essential change needed to restore and replenish the world's seas and oceans is that they are *all* protected as a universal principle founded in law and effectively enforced.

There are invaluable concepts in customary law and principles of sustainability in treaty law that can help transform our relationship with the sea. They provide the foundation for a completely different way of managing our impacts upon marine environments.

They are:

- The wise use of natural resources
- The equitable sharing of natural resources
- Provision for the needs of future generations
- The accountability of governments (to manage natural resources wisely and equitably)
- To safeguard the integrity of global commons, i.e. areas beyond national jurisdiction, from state or corporate territorial claims.

These central concepts from the Public Trust Doctrine and the Common Heritage of Humankind can be incorporated into a new statutory framework by revising, reforming and strengthening the **UN Law of the Sea** and the **United Nations Framework Convention on Climate Change**. This will bring the laws up to date with current concerns that have developed since these two treaties were originally drawn up.

This may be achieved by:

1. An **Implementing Agreement** for the **Law of the Sea**.

The key components of this Implementing Agreement are:

- a) The establishment of a global paradigm of ecosystem-based and precautionary management to give priority to the integrity and health of the entire marine environment over any other interest or activity, both within exclusive economic zones and on the high seas. Destructive and damaging practices would thus become criminal acts. The crucial outcome would be that individuals responsible for running the offending corporations would be held to account, under criminal law.
- b) Having the legal authority to tackle the root causes of poor implementation and compliance with a reformed system of governance, with the mandate to force responsible practice upon governments and corporations, and to reconcile the various administrative bodies, legal structures and international and regional agreements into a cohesive system.

This governing mechanism would be less of a centralised and ocean authority, and more of a co-ordinating body that brings together a range of resources and expertise to manage anthropogenic impacts on the sea. It would combine 'western' science with traditional knowledge to find the best solutions.

It would also have the mandate to apply and enforce the Law of the Sea with a transparent, adaptive and 'whole ocean' approach. This could be delivered by an extension of the powers and jurisdiction of the International Criminal Court set up by the Rome Statute.

- c) The amendment of Article 116, namely the 'Right to Fish on the High Seas', to help combat illegal, unreported and

unregulated fishing. Only ships registered with (and regulated by) a regional body would then be permitted to fish on the high seas.

- d) Amendment of Article 136 from the 'Area and its resources are the Common Heritage of Mankind' to include not only the sea bed but the sea above it – in other words all the high seas, as Arvid Pardo originally proposed in 1967 (*see page 19*).
- e) The overhaul and reconstitution of the Regional Fisheries Management Organisations as Regional Marine Biodiversity Organisations (RMBOs), or similar, to re-define priorities and help alter mindsets and to ensure co-ordination within the system. The regional bodies should be developed and strengthened to improve efficiency and accountability, and to promote conservation and compliance within their Law of the Sea remit. An emphasis on co-operation and transparency would be central to success.
- f) The establishment of a high-seas enforcement agency to provide co-ordinated monitoring, control and surveillance around the world with a mandate to board and inspect vessels, conduct investigations and withdraw licences for their continued use of the sea when the law is breached.

This could be enforced by national coastguards and navies, acting in conjunction with an organisation such as the International Monitoring, Control and Surveillance Network (imcsnet.org).

- g) The empowerment of the International Tribunal for the Law of the Sea with the authority to adjudicate cases of non-compliance with the Law of the Sea (including those states and corporations responsible for major land-based sources of marine pollution, such as those failing to meet agreed carbon dioxide emission reduction targets).

2. An amendment of the **United Nations Framework Convention on Climate Change**.

Such an amendment requires a new protocol to address ocean acidification. Scientists, intergovernmental and non-governmental organisations have been warning policy makers of the serious threats posed by ocean acidification, and yet this issue has remained on the periphery of conferences at 'side events' (such as at the Warsaw Conference in November 2013).

Ocean acidification shares the same root cause as climate change. The UNFCCC is the primary international instrument confronting excess emissions of carbon dioxide and therefore it is logical that the UNFCCC should also address ocean acidification.

The Conference of Parties should:

- a) Acknowledge fully the science which shows that ocean acidification is caused by increased anthropogenic carbon dioxide in the atmosphere, that it is a major threat to chemical and ecological ocean systems and that it should be addressed without delay.
- b) Commit to take urgent action to arrest ocean acidification through the process of the UNFCCC and find common solutions to confront both climate change and ocean acidification.

This means that the Parties should:

- Review and revise targets of carbon dioxide emissions in line with current scientific advice.
- Introduce a set of indicators to measure ocean acidification and the changes that it is causing and modify mitigation mechanisms to ensure that they tackle ocean acidification and do not contribute to it.

- Amend Article 4 (d) of UNFCCC in order to avoid mitigation strategies that contribute to ocean acidification: 'Parties to promote and cooperate in the conservation and enhancement of sinks of greenhouse gases including oceans', – remove 'including oceans'.
- Be clear on precisely what is expected of each State to reduce the negative effects of ocean acidification.
- Call for parties to take a precautionary approach to anticipate, prevent or minimise the causes of ocean acidification.

In conclusion

The way in which humankind despoils our watery world is depressing indeed. Governments which we elect, which we empower, which we pay for, are failing us and they are failing the natural world. They lack dependable leadership. They forgo their public duty to protect invaluable ocean resources from pollution and over-exploitation. They allow the cruel and unnecessary slaughter of millions of sea creatures and the ruin of undersea habitats. Some make the problem even worse by subsidising unviable and damaging commercial fishing and other harmful practices.

The analogy is less a case of governments rearranging the deck-chairs as the Titanic sinks, and more of them having steered the ship towards the iceberg in the first place.

Safeguarding Earth's systems and resources cannot be a side-line concern. A resilient natural world is central to life itself and therefore should be central to policy making at the highest level. Without it, all the shareholders' profits and annual returns in the world mean nothing.

Radical action is needed to deliver bold and innovative legislation and to create a forward-looking and cohesive system of governance. Governments should ensure the accountability of business and industry by criminalising serious harm to the marine environment or to sea life. When the damage is a crime, it becomes a mechanism of enforcement, punishable by law and those in positions of superior responsibility are liable and can be prosecuted. The stranglehold, of putting profit before the well-being of people and the planet, is then broken.

We need another kind of politics to create a society and an economy which values life: the politics of optimism to map out a different future for the sea, one which focuses on solutions and not on obstacles. We need a sweeping reversal of the norm, a grand and universal plan, no longer making do with piecemeal measures in

damage limitation, that don't confront vested interests and keep only pockets of the sea intact.

There is always resistance to change. 'Business as usual' is a stubborn pattern of behaviour and difficult to shift even when the environmental benefits of comprehensive reform are undisputed.

The emergence of a new oceans treaty to help conserve high seas biodiversity is very good news, but it still clings to the notion of fragmentary protection. Creating protected areas doesn't stem the core problem, which is a combination of bad practices and a plundering mindset – it just moves the problem somewhere else.

The economic and humanitarian advantages are also clear, not least for the millions of people who depend on healthy seas for food security and other resources. Enlightened thinking will bring an enlightened solution. The co-operation of governments can deliver the big picture legislation so urgently needed to bring our attitude to the sea out of the Dark Ages and into the twenty-first century. In an era of common sense, wider benefits will result. Equitable and rational marine management will pre-empt conflict between states and encourage international peace.

Altering an ingrained cultural perspective is difficult, although change can come within a generation. Once the underlying precedent or cultural attitude is in place, it's like a map or a handbook – it simplifies everything that follows and clarifies what is acceptable and what is not. This one fundamental change in perspective, to protect all seas and oceans as a universal principle, could help solve a broad range of serious environmental and social problems that we face, right across the world.

The concept is simple. It is logical and the legal framework for it is almost there. And as with many of society's steps forward, essentially it is about ending what is wrong and replacing it with what is right.

Appendix 1: Summary of the major causes of marine degradation

Fishing

The UN Food and Agriculture Organisation (FAO) estimates that 90 per cent of the world's commercial stocks are over-exploited, fully exploited or depleted. Some are already commercially extinct. Approximately 90 per cent of large predatory fish, such as cod and tuna, swordfish, halibut and skate, have been fished out since large-scale industrial fishing began in the 1950s. Removing these species dismantles the ecological structure of marine ecosystems, perhaps for good. If we disrupt a chain in the web of life there are always unforeseen consequences.

The global fishing capacity is reckoned to be four times too large for the amount of fish in the sea. Too many ships, too well-equipped are chasing too few fish. Many species simply cannot mature, breed and multiply before they are caught. All manner of sea life is killed in astounding numbers as by-catch. Every year, an estimated 300,000 whales, dolphins and porpoises die entangled in fishing nets, along with thousands of critically-endangered sea turtles.⁵

Long-line fishing uses lines up to 130 km long, with baited hooks spaced at every 30cm, putting roughly 426,600 hooks on one fishing line. The bait attracts all types of marine life: an estimated 300,000 seabirds a year are drowned by long-lines,⁶ including rare species of albatross, plus turtles, seals, dolphins and a wide range of other 'non-targeted' life. Damaging fishing techniques, such as bottom trawling and blast fishing, wreck delicate habitats like coral reefs which have likely taken centuries to develop.

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⁵ <http://www.theguardian.com/environment/2012/jul/04/wwf-appeal-threat-whales-oil>

⁶ <http://www.rspb.org.uk/supporting/campaigns/albatross/problem/threats.aspx>

Every year thousands of tonnes of fish are thrown back overboard, dead. They are discards, unwanted either because they have no economic value or because regulations on quota and minimum landing size make them prohibited catch. In 2010, scientists from the International Council for the Exploration of the Seas (ICES) estimated that over 60 per cent of the catch was discarded in the North Sea, the figure rising to over 90 per cent for cod aged under a year.

Subsidies

Governments around the world spend around 20 billion US dollars on counterproductive subsidies that perpetuate over-fishing. The European Union, for instance, subsidises an unprofitable and unsustainable fishing fleet with over €1 billion of tax-payers' money each year.

Half a million industrial fishermen catch 30 million tonnes of edible fish, discarding at sea another 15 million tonnes, whilst burning 37 million tonnes of fuel. The artisanal fisheries also catch about 30 million tonnes of seafood. But they employ 12 million people, discard almost nothing, use a seventh of the fuel and receive a fifth of the subsidies. Also, the nutrition they provide plays a much bigger role in the health of their local populations than the more expensive fish sold in developed countries.

Indeed, nearly all of the fish the small-scale fishers catch is eaten, while the industrial ships, in addition to the 30 million tonnes of edible fish they take, also haul out another 35 million tonnes of everything from other fish to plankton for transformation into oils or fish meal, which are used for fertiliser and feed. The result: many of the non-food fish that the edible fish depend on have disappeared, along with vast amounts of plankton, the base of the food chain. (C. Pala

Inter Press Service News Agency, 2014)

Food security

A billion people rely on fish as their main source of protein and many of them cannot afford alternatives. Also, 180 million people are directly or indirectly employed in fisheries, mainly in the developing world.⁷ Subsistence fishermen are up against large factory ships often supported by government subsidies, equipped with sonar equipment, mechanised hauling gear and nets up to 600 metres long and 200 metres wide.

According to the Food and Agriculture Organisation, all West African fishing grounds are either over-exploited or fully-exploited. Heavily subsidised EU fleets, plus industrial trawlers from Russia, China and Norway, take hundreds of thousands of tonnes of fish each year off the coasts of countries such as Guinea, Sierra Leone and Liberia. Over 1.5 million local fishers, who rely on fish for their livelihoods and for their food, cannot compete with them.

Issa Diene is one of many Senegalese fishers vying with the industrial ships in his 30-foot wooden pirogue to catch fish off the coast of Dakar. 'I used to bring in between 15,000 francs and 20,000 CFA francs [US\$ 30–40] each day, then the big boats started coming and taking all our fish. Now, I am lucky if I catch 5,000 CFA francs [US\$ 10] a day.' (allAfrica.com)

Illegal, unreported and unregulated fishing (IUU)

IUU fishing, or 'pirate fishing', is a major problem and may account for up to 37 per cent of the catch in some fisheries.⁸ IUU has environmental, social and economic consequences, particularly in developing countries with the direct loss of the value of the catches.

⁷ <http://www.cbd.int/development/doc/sdg-feb2014-factsheet-en.pdf>

⁸ <http://ejfoundation.org/sites/default/files/public/Pirate%20Fishing%20Exposed.pdf>

Global losses due to IUU are estimated to be between US\$ 10 billion and 23.5 billion each year,⁹ with West Africa having the highest levels of IUU fishing in the world.

The Law of the Sea requires nations to monitor and control their fishing vessels. However, many industrial vessels consistently fish illegally, uncontrolled by their flag state.

They fish in exclusion zones, refuse to pay fines, cover the ship's identification markings, fish with banned equipment, market fish illegally and bribe enforcement officers etc. The lack of management bodies with authority over much of the high seas opens up expansive areas to illegal and damaging fishing.

Slavery

Migrant workers are being forced onto Thai fishing ships for many months or years and enduring violent working conditions with little or no pay, in order to supply prawns to supermarkets in the United States and Europe, including Walmart, Tesco and Morrison's.

A six-month investigation by the Guardian newspaper revealed that Thailand's fishing industry is "built on slavery", with trafficked workers subjected to 20-hour shifts, regular beatings, torture and even execution¹⁰.

Other causes of marine degradation in brief

Ocean acidification

The ocean absorbs huge quantities of carbon dioxide from the atmosphere. As levels of anthropogenic emissions rise, so in turn does the level of carbon dioxide absorbed by the ocean and this

⁹ <http://ejfoundation.org/sites/default/files/public/Pirate%20Fishing%20Exposed.pdf>

¹⁰ <http://www.theguardian.com/global-development/2014/jun/10/-sp-migrant-workers-new-life-enslaved-thai-fishing>

is changing the chemistry of seawater, essentially reducing its alkalinity and making it more acidic.

The full effects of these changes are still uncertain, but they are known to inhibit the growth of shells and body structures of many marine species. This could have drastic consequences on whole ecosystems and for biodiversity, wild food harvesting, and the global economy. Deep-water corals and tropical coral reefs are especially vulnerable.

Coral reefs are packed with colour and life. They have the world's greatest overall diversity of life (33 of the 38 known animal phyla,¹¹ compared to eight phyla in tropical rainforests) and are home to about 25 per cent of all marine species, including mammals, fish, molluscs, worms, crustaceans, echinoderms and sponges.

The International Programme on the State of the Ocean (IPSO) describes three key factors: the 'deadly trio'. They are the dissolved oxygen level in the sea and oceans, increased acidity and ocean warming. There is evidence, the IPSO argues, that these risk factors are altering the physical and chemical basis of ocean life. Such a fundamental change in the planet's primary life support systems has occurred in the past, and is closely correlated with mass extinction events.

When the primary physical and chemical bases change, then so does the biological base of the pyramid of life together with the foundation of the food chain. At the base of the biological pyramid are zooplankton and phytoplankton. Both forms of life (animal and plant) make extensive use of calcareous shells.

If acidification advances rapidly, these species become extremely vulnerable and given that they are the primary food resource, this has profound impacts on the trophic pyramid of life.

This [acidification] is unprecedented in the Earth's known history. We are entering an unknown territory of marine

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¹¹ Phyla are taxonomic sub-divisions below Kingdom and above Class.

ecosystem change, and exposing organisms to intolerable evolutionary pressure. The next mass extinction may have already begun. (IPSO, 2013 <http://www.stateoftheocean.org/pdfs/IPSO-Summary-Oct13-FINAL.pdf>)

Rising sea levels

The sea is warming as a result of climate change. Sea levels rise as a consequence, which puts coastal communities at risk and affects many forms of marine life. The plight of the polar bear struggling to survive on the diminishing ice floes is well known. Shallow water habitats like mangroves and coastal wetlands are also threatened.

Corals are very sensitive to temperature changes. Increased water temperatures cause coral bleaching (when coral polyps, stressed by heat or ultraviolet radiation, expel the symbiotic algae that live within them). As these algae provide most of their food and oxygen, the corals die. In some areas, such as Sri Lanka and Kenya, up to 90 per cent of coral reefs have been lost.

Mining, oil and gas

There are considerable adverse impacts from the mining, oil and gas industries. Apart from the widespread damage caused by oil spills, the processes of dredging, prospecting and drilling can destroy fragile undersea habitats. Deep-sea mining is expanding fast with the development of giant robotic cutters which strip swathes of the seabed. Negative impacts on marine life include disturbances and discharges in the water column, acoustic pollution affecting whales and dolphins, the destruction of benthic communities on the sea floor and sediment plumes covering sensitive species.

Scientists warn, 'the last great unexplored wilderness on Earth is about to experience industrial-scale mining that could change the

face of the pristine seabed of the deep ocean for generations to come'.¹²

There are three stages to the exploitation of offshore oil: exploration, production and shipping. Each stage has environmental risks. (Exploratory and production drilling, for instance, produces cuttings that become mixed with oil and drilling chemicals. The habitual dumping of cuttings into the ocean has significant negative effects on marine life.)

Aggregate dredging, chiefly for use in the construction industry, has a devastating effect on shallow, coastal habitats. Both sand and gravel sea beds support rich and varied ecosystems and are important spawning and feeding areas for many types of fish. Aggregate sites are often located precisely in these sensitive areas, and intensive and repeated dredging can wipe out these habitats completely, before their value has been recognised.

Pollution

There are many types of pollution at sea. Dramatic accidental oil spills, such as that from the Deepwater Horizon rig in the Gulf of Mexico and the contamination of the Pacific from Japan's Fukushima's crippled nuclear plant, grab the headlines. But the long-term, cumulative effect of pollutants entering the sea on a regular and daily basis is also disastrous.

For instance, fertilisers running off the land into rivers and into the sea cause eutrophication which de-oxygenates the water and results in 'dead zones'; the sea and all life within it simply dies. In 2018, a report in Science magazine found there were over 500 dead zones worldwide.

Ghost fishing is the term for all the fishing gear thrown overboard: nets, lines, etc. which continue to kill large numbers of marine animals long after they are discarded. The majority of sunscreens on the market contain chemicals such as oxybenzone and octinoxate

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¹² Steve Connor, The Independent, 2014

that harm or kill many marine species when they are washed into the sea.

Other forms of pollution include untreated sewage, toxic chemical discharges from industry, waste from nuclear power stations, dumping and ships flushing tanks. The United Nations Environment Programme (UNEP) estimates that 20 per cent of pollution at sea is from the deliberate dumping of oil and oily engine waste, from accidental spills and offshore oil drilling.

The Law of the Sea Article 194 requires states:

to prevent, reduce and control pollution of the marine environment from any source.

Plastic pandemic

Over the past two decades there has been a massive proliferation in the production of plastic: bottles, food containers, bags, netting, packaging, etc. Enormous amounts of plastic pollution are found at sea and on the shore (most of which originates from land). Plastic kills all types of marine life, as they ingest it, are trapped by it, strangled by it, or choke on it. The great Pacific garbage patch is one of several gyres of waste. It is an accumulation of floating debris, mainly plastic, estimated to be 1.6 million sq km (over twice the size of Texas).

In 2006 the IUCN's report *Ocean Blues* recorded 46,000 pieces of plastic per square km floating on the world's oceans, killing an estimated 1 million seabirds and 100,000 marine mammals every year. Since the report, the amount of plastic marine debris has continued to increase.

Massive amounts of tiny granules of plastic called nurdles, used in the manufacturing process, reach seas and beaches. Millions of tonnes are produced annually. Mammals, fish and birds mistakenly eat them and die in large numbers.

They also kill the smaller creatures such as barnacles and worms, as they ingest them. Plastics release toxic styrene compounds which contaminate sea life right along the food chain, including the fish we eat. Plastic can take hundreds or thousands of years to break down.

Shipping

There are approximately 86,000 commercial ships over 100 tonnes in the world's fleet. Shipping includes the bulk tankers and container ships, plus smaller cargo vessels, car carriers, cruise ships, ferries and others – but not fishing or navy vessels. Commercial shipping transports around 90 per cent of international trade.

New research reveals that the contribution of shipping to climate change has been underestimated and that the industry's greenhouse emissions are around one billion tonnes a year,¹³ compared with about 650 million tonnes from aviation.

Despite regulation, administered by the International Maritime Organisation, shipping the world over is significantly harmful to marine habitats. Apart from greenhouse gas emissions, impacts include accidental oil and chemical spills, ship groundings, anchor damage, noise and wave disturbances, collision with large mammals, dumping rubbish, sewage, oily waste, and the transfer of alien species via discharged ballast water.

Marine aquaculture

Fish and shellfish farming occur in coastal areas and in the open sea (and includes cultivating plants such as seaweed). As wild fish stocks have fallen due to over-fishing, fish farming is the world's fastest-growing animal protein source. The species raised in marine fish farms include salmon, seabass, cod, mussels, oysters and shrimp. There are considerable negative effects on the marine en-

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¹³ European Commission, 2014

vironment. For example, thousands of acres of mangrove forests are cleared to make way for prawn and shrimp farms.

Fish farming methods are generally intensive. Fish are reared in very crowded conditions and are vulnerable to disease, and so are regularly dosed with antibiotics and pesticides.

Marine ecosystems and their wild species are damaged or destroyed as waters become contaminated with faeces, uneaten food pellets, parasitic lice, dead fish and residues of antibiotics and pesticides flowing out into the surrounding areas.

Many farmed fish are fed on wild fish, frequently depleting the wild stock and having a knock-on effect down the food chain. An example of this is the recent collapse of the North Sea puffin population due to over-fishing their food supply. The sand eel particularly, a key food species for the puffin, had been intensively fished principally to provide fish meal for the salmon farming industry.

Appendix 2: Additional courses of action

1. Apply a range of measures to tackle over-fishing, including:
 - Force a substantial reduction in the global fishing fleet to bring capacity in line with stocks.
 - Ban all methods of fishing which destroy undersea habitats, and ban government subsidies which fund over-capacity and perpetuate destructive practices.
 - Make obligatory the use of the ecosystem and precautionary approaches to the management of fisheries.
 - Create a global register of fishing vessels.
 - Develop community-based management schemes.
 - Countries to ratify and implement the Port State Measures Agreement to: strengthen port controls and landings inspections; deny port access to vessels engaged in IUU fishing; prevent illegally and unsustainably caught fish from entering the market.
 - Tighten up on flag of convenience states failing to enforce the Law of the Sea with strict penalties for non-compliance.
 - Install vessel monitoring systems (VMS) on all vessels over 12m long and make their use mandatory.
2. Introduce mandatory licensing to force change. For example, as a means of weaning us off fossil fuels and transferring to a renewable energy-based economy, new licences for off-shore oil production would not be issued, thereby compelling the industry to invest in and develop renewables. Those with existing licences could continue to operate until the licence expires.

With regard to plastics, for example, in order to obtain a discharge licence, waste-water companies would be obliged to improve their filtering methods to prevent plastics entering rivers and seas. Similar licensing constraints would be applied to all industries across the board.

3. Conduct research into the development of alternative fertilisers, packaging, etc. to stem land-based sources of pollution and aim to see single-use plastic as a material from the past.
4. Ensure that rigorous Environmental Impact Assessments are submitted and approved before any type of industrial activity can begin at sea in order to ensure the safety of habitats and ecosystems.
5. Enable the restructuring of the aquaculture industry in line with higher environmental standards.
6. Strengthen the International Maritime Organisation's powers of regulation, surveillance and enforcement towards the reduction of all forms of environmental damage caused by shipping.
7. Promote the development of low-carbon and zero-carbon energy technologies to counteract the impacts of warming seas and ocean acidification.
8. Mount a widespread global education programme to foster a greater understanding of Earth's natural systems and biodiversity. The programme would convey the responsibility we all have in our daily lives as consumers. It would explore other economic and political systems, fairer and wiser systems, that are not based wholly on monetary values.

From them [our values] come our decision-making which in turn, on a political level, drives our policies and practices that govern society for many years. Sometimes we need to challenge our values when it becomes abundantly clear that they are not serving us well. (Polly Higgins, *Earth is Our Business*, 2012)

Experience shows that fisheries are best managed by those who know them and fish them, such as in the Caletas of Chile. Giving responsibility to coastal communities to manage the sea around them provides local fishers with the incentive to reduce and prevent marine degradation from over-fishing and pollution. Well-managed waters will provide an indefinite source of income and food for them. Local knowledge of conditions, species and habitats is also invaluable.

Managing wild fisheries wisely increases profitability. Norway's strategy is simple: it is to achieve a sustainable harvest from a resilient sea. There is a ban on discards, the industry follows scientific advice to determine the amount of fish taken and has tight gear restrictions, seasonal closures for spawning, and areas closed for longer periods to allow the recovery of habitats and stocks. And it works. Stock sizes of pelagic fish (mid water or near the surface) almost tripled in 25 years. In 2017 for instance, Norway exported over 1.7 billion US dollars worth of white fish (such as cod, saithe and haddock).

Appendix 3: Finance

Taking radical and universal action to rescue and restore seas and oceans will be significant, but the cost of not doing so will be far higher – in fact, incalculable.

Potential sources of funding to implement a protective strategy include:

1. **Benevolent subsidies** should replace harmful subsidies. The billions of dollars governments pay to prop up their fishing industries could instead, help fund a comprehensive system of monitoring and surveillance and the re-employment of a proportion of fishers to enforce regulations to protect the ocean.
2. **National Contributions.** If for example, the top 20 wealthiest countries contributed just 0.01% (one ten-thousandth) of their annual GDP to a protective fund, it would generate over 7 billion US dollars. (To give this figure some perspective, the BBC reported in 2009 that governments around the world had spent almost US\$ 11 trillion US dollars to bail out the banks, which is 2619 times as much money).
3. **The market** can generate income based on ocean activities through licensing for responsible mining and bioprospecting, fishing, shipping and other commercial activities.
4. **The Global Environment Facility** (GEF) is the financial mechanism of the Convention on Biological Diversity (CBD) and is the largest public funder of environmental projects in the world. The GEF helps developing countries to achieve the CBD's objectives (it has supported over 4,500 biodiversity projects in 170 countries).

The GEF grants financial support to a range of projects. Two examples are: US\$ 27.45 million to the Guinea Current Large Marine Ecosystem Project and US\$ 35.8 million to the Im-

plementation of the Sustainable Development for the Seas of East Asia.

Appendix 4: The ecosystem approach to management and the precautionary approach

The ecosystem approach considers the complexity of all the interactions within an ecosystem and between other ecosystems (rather than considering single species and ecosystems in isolation). Appreciating that our knowledge of the marine environment and its ecosystems is limited, it is logical therefore to manage the human activities which impact upon them, rather than attempting to manage the ecosystems themselves.

A true ecosystem approach must understand the nature of ecosystem integrity and allow human activity to exploit the environment and its resources in an adaptive and sustainable manner. It should be founded on the precautionary approach, which means that no activity should occur until it can be shown that damage will not result from it (and not the reverse, i.e. that any activity may occur until there is reason to believe that it may cause damage, although proof remains unavailable).