Humans have what can be described as a distinct flaw; the ability to empathise with other species and to recognise the harm we do to them. I refer to this as a flaw because without it we could happily go about our daily lives without a second thought to the planet. For the majority of us we are able to do so anyway, so focused on our lives that we are disconnected from the world around us and the bigger picture becomes difficult to see. Even for those who devote their careers to understanding the human effects, known as anthropogenic impacts, on the Earth, the reality of modern life means that they too will have a negative impact upon the natural environment. Take a moment to consider your daily life, the impact on the environment of every item you use, every piece of clothing you wear, everything you eat and drink. I doubt you will make it to midday before your mind is boggling with all the possible impacts and consequences. Anthropogenic impacts are huge and varied, including anything from habitat destruction to pollution, from hunting to an introduction of invasive species. We are currently losing species at such a rate that it has been compared to the "big five" mass extinctions, and although new research has suggested that we are not yet in the grips of the sixth mass extinction without a concerted effort on our part extinction rates will only intensify.

Now I'd like you to consider the oceans, they're probably not something you think about often, out of sight is out of mind after all, but the oceans cover almost 71% of our planet Earth. The estimate of known marine species now stands at nearly 250,000 following the completion of the Census of Marine Life in 2010, and no doubt there are many more to be discovered.

"How inappropriate to call this planet Earth when it is quite clearly Ocean" Arthur C. Clarke

Although it was the overriding belief for many years, persisting into the 20th century, the oceans are not in fact immune to our impacts despite their size. The main threats to the oceans come from pollution, overfishing, destruction of habitat, climate change and ocean acidification.

Coral reefs are what draw many people to explore our seas, over 4000 species of fish are estimated to inhabit the world's coral reefs, this is around a quarter of all marine fish. Yet they are probably the most threatened ecosystem in the oceans, facing threats from; pollution, fishing, sedimentation, and climate change. Coral bleaching occurs when corals are faced with heavy stressors and the symbiotic zooxanthellae found within their tissues are expelled. Bleaching can result in extensive mortality on reefs if the stressor is not removed. As global temperatures increase we are likely to see more and more coral bleaching events with increasing severity. With the addition of other threats there is a chance we will lose our coral reefs within our lifetime.

Pollution

Along with chemicals such as fertiliser and pharmaceuticals, plastic is a major source of pollution in our oceans. Vast expanses of plastic and other rubbish can be found accumulating in ocean currents in a "swirling garbage vortex" such as the Great Pacific Garbage Patch.

I asked you earlier to think of the items you use on a daily basis, now I'd like to you to consider how many of these items were made from plastic, chances are the answer is a great many. From your toothbrush to drinks bottles to a carrier bag, so many of the things we use today are made from plastic it seems almost impossible to imagine a world without it. Perhaps instead of calling this planet Earth or Ocean it should it in fact be planet Plastic? Plastic nurdles, the small pellets which are melted down and made into the products we know and love are great escape artists and can be found in every ocean and on almost any shoreline, so much so that they are now nicknamed "mermaids tears". Plastic attracts and accumulates pollutants within the water, if this plastic is ingested by animals and it has indeed been found inside zooplankton and filter feeders such as mussels the plastic and associated pollutants may well accumulate up the food chain and end up on our plates.

The Deepwater Horizon oil spill was the largest accidental marine oil spill in history, in April 2010 an explosion caused the offshore oil platform to sink, resulting in the release of around 5 million barrels of crude oil into the Gulf of Mexico. It is likely to be some time before we see the real effects.

http://ngm.nationalgeographic.com/oilspill - check out the national geographic website to learn more about the Gulf oil spill, including a great interactive page for younger ones to learn all about the habitats found in the Gulf of Mexico.

Overfishing and habitat destruction

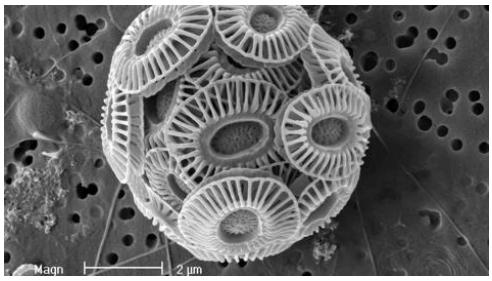
The fishing industry is vital both as a source of food, with more than a billion people reliant on fish as their main source of protein, and economically, with over 30 million people employed in the industry. Yet, with a few exceptions, it is poorly managed with many stocks being fished unsustainably. Many fisheries have been run in a "boom and bust" manner, that is, the act of fishing a stock intensively until it is no longer economically viable and moving onto the next. This has forced us to continually seek new populations to fish, even forcing us to move into the deep-sea where fisheries are particularly vulnerable due to their slow growth rates and late maturity. Not only is fishing drastically reducing populations but it is also damaging ocean habitats, for example, bottom trawling is hugely destructive to the sea floor habitat and could be compared to the clear-cutting of the rainforest. Coastal areas such as mangroves have also been extensively changed or lost for activities such as aquaculture.

Climate change and ocean acidification

Global warming is expected to lead to a temperature rise of 1-2°C by the end of this century, which could have devastating consequences for coral reefs. Changes in temperature are also likely to lead to a change in the distribution and timing of plankton blooms and may well put them out of sync with the species that depend on them most.

The oceans absorb CO_2 from the atmosphere forming carbonic acid and acting as an important sink of CO_2. As the amount of CO_2 in the oceans increases due to anthropogenic inputs to the atmosphere the oceans are becoming more acidic. Ocean acidification will have an effect on all

species that have a calcium carbonate structure including phytoplankton, coral and molluscs. Affecting their formation and actually dissolving the structure in areas of higher acidity.



A member of the plankton, coccolithophores such as this will be highly vulnerable to ocean acidification.

So with these problems in mind I started to write, hoping to awaken this passion in others, hoping to save our seas; not only for me, for you and for the people to come but for the pure intrinsic value of our oceans, a concept difficult for many to understand. The intrinsic value of the natural world is the value that it has simply in its existence, independent of any worth such as the provision of ecosystem good and services to us. A fish, for instance, would not be seen merely as a source of food but as having value in itself. When we consider intrinsic value we are delving into the world of environmental ethics and it is up to the individual to decide what they believe to be right and wrong; whether or not non-human life has intrinsic value. It has been suggested that if we do believe something has intrinsic value then it is our moral duty to protect it and refrain from damaging it.

> *"...it is important to see that animals are not defined by their relation to us. Most animals, after all, have lived out their spans in sublime indifference to the habits of those odd chattering bipeds with the removable plumage. Even if we had never existed, they would still be here. We are just as accidental to them as they are to us."*
> Colin McGinn.

Even if you don't consider marine life to have intrinsic value you surely can't argue against the instrumental value of the oceans, that is, the value of the ecosystem goods and services we gain from them. Marine ecosystems provide us with many things including; food, construction material, recreation, coastal defences, and regulation of climate, examples of which can be seen in the table below.

The concept of ecosystem valuation is fairly new and few quantitative studies have yet been published. One well known paper (Costanza *et al.* 1987) estimated the total value of global ecosystem services at $33 trillion annually with marine ecosystems contributing about 63% ($20.9 trillion/yr) to this figure.

Table 1.1 EXAMPLES OF ECOSYSTEM SERVICES PROVIDED BY DIFFERENT MARINE AND COASTAL HABITATS
(X indicates the habitat provides a significant amount of the service)

ECOSYSTEM SERVICES	Coastal									Marine		
	Estuaries and marshes	Mangroves	Lagoon and salt ponds	Intertidal	Kelp	Rock and shell reefs	Seagrass	Coral reefs	Inner shelf	Outer shelves edges slopes	Seamounts & mid-ocean ridges	Deep sea and central gyres
Biodiversity	X	X	X	X	X	X	X	X	X	X	X	X
Provisioning services												
Food	X	X	X	X	X	X	X	X		X	X	X
Fibre, timber, fuel	X	X	X						X	X		X
Medicines, other resources	X	X	X		X			X	X			
Regulating services												
Biological regulation	X	X	X	X		X		X				
Freshwater storage and retention	X		X									
Hydrological balance	X		X									
Atmospheric and climate regulation	X	X	X	X		X	X	X	X	X		X
Human disease control	X	X	X	X		X	X	X				
Waste processing	X	X	X				X	X				
Flood/storm protection	X	X	X	X	X	X	X	X				
Erosion control	X	X	X				X	X				
Cultural services												
Cultural and amenity	X	X	X	X	X	X	X	X	X			
Recreational	X	X	X	X	X			X				
Aesthetics	X		X	X				X				
Education and research	X	X	X	X	X	X	X	X	X	X	X	X
Supporting services												
Biochemical	X	X			X			X				
Nutrient cycling and fertility	X	X	X	X	X	X		X	X	X	X	X

UNEP, 2006. Examples of ecosystem services provided by marine and coastal habitats.

> "... Our lives depend on the living ocean – not just the rocks and water. But stable, resilient, diverse living systems that hold the world on a steady course favourable to humankind. " Sylvia Earle

Degradation of the oceans will lead to a loss of these ecosystem goods and services which will affect human well-being e.g.

Decreasing fish stocks will threaten our food security, and result in substantial unemployment e.g. when the Newfoundland cod fishery collapsed in the early 1990s it resulted in the loss of tens of thousands of jobs and cost at least $2 billion in income support and retraining costs.

Loss of coral reefs and charismatic species will threaten the tourism industry.

Degradation of coral reefs and other coastal habitats such as mangroves will threaten the safety of coastal communities.

Putting this ethical debate of value aside we should contemplate what we are losing when we lose biodiversity, whether you revere the environment and life within it for its intrinsic or for its instrumental value we reach the same conclusion; we must do our best to protect and maintain biodiversity or we will suffer great losses.

What can we do?

Of course, what I have described at the beginning of this article as a flaw is what in fact makes humans great, it is our love for the natural environment that drives us to explore, learn and to

better ourselves. So here comes the part where I ask you to do your bit to help protect our oceans.

- Reduce your energy consumption – turn electrical items off, use energy efficient light bulbs and insulate your home.
- Reduce, Reuse, Recycle - Reduce your use of plastic; avoid using plastic bags and buying plastic water bottles.

- Eat sustainable seafood – reduce the demand for overexploited species – look for the Marine Stewardship Council (MSC) label when choosing your seafood to guarantee it has come from a sustainable source. Alternatively, use the MCS seafood guide http://www.fishonline.org/ or download your free pocket guide here http://www.mcsuk.org/fisheries/ to help you make informed decisions.

- Help take care of your local beach - always take your rubbish away with you, participate in beach cleans.

The age of discovery is not yet over as the Census of Marine Life showed us, there is much to learn of our oceans and we must strive to protect them before these discoveries are lost to us forever.

- Educate yourself about the oceans, Sylvia Earle's book *The world is blue, how our fate and the oceans are one* is a great read if you'd like to learn more about these issues.
- Educate and inspire others – share your knowledge with others.

We cannot change the past but we have the power to change the future.
I implore thee, to please hear this request from the sea; don't forget me.

Further Reading

- Census of Marine Life (2010) *Highlights of a Decade of Discovery*. Census of Marine Life, Washington DC.
- Earle, S.A. (2009) *The world is blue, how our fate and the oceans are one*. National Geographic Society, Washington, D.C.