

## Plastic and Ocean

A summary of blog posts by Daniel Hansson, marine scientists. <http://danielhansson.se/>

When Charles Moore started his journey on the Pacific Ocean in his newly purchased catamaran in the mid-1990s, he did not realize that the voyage would change his life. What he discovered would be known as the great Pacific garbage patch, the large accumulations of debris in the middle of the Pacific Ocean. In the media, this has been described as a large floating continent of garbage; it became great media hype. It is like a soup of waste of various sizes.

In his new book titled Plastic Ocean, which deals with the problem he says that something must be done about littering, and something must be done now. We cannot wait any longer. Every Swedish person produces about half a ton of rubbish every year. After all, think of all food scraps, packaging and other things that you throw away each year. You also live in a part of the world where most of the debris is disposed of in an efficient manner, either by incineration or recycling. But Scandinavia is a global anomaly. Almost no other country has the same type of highly efficient waste disposal or recycling. Globally, a lot of rubbish goes into the nature, it is not disposed of properly. Also note that plastics are an increasing part of trash volumes. Plastic cannot be broken down in nature, especially not in the sea!

Just a few years ago we passed a historic turning point when we produced more plastic than meat on earth. The difference is that the mountain of meat is eaten up while the mountain of plastic is left in the nature for a very long time. The only way the plastics will disappear from our world is through burning. Only a small fraction of all plastics are burned today.

Furthermore it is estimated that perhaps as much as 10-15% of all plastics annually ends in the sea. There it is cold, dark and relatively little oxygen - lack of everything needed to break down the plastic.

Marine debris, which to 90% consists of plastic, has a tremendous impact on the marine ecosystem. Nearly all fish, birds, seals, whales, turtles and other creatures have plastic in their stomachs. Charles Moore explains how our wear-and-toss society slowly starves and suffocates the sea and its inhabitants. Tragically, this is done partly with the industry's knowledge and reminds us of the consumer's ignorance.

On another level, we also have the knowledge that the plastic contains amounts of chemicals added to give the product the required characteristics? In the book we get a review of the most common chemicals, what they do to your body and how easily they can escape from the plastic and find their way into the nature. Do you know that a large proportion of baby toys are so toxic that they kill fish within a few days? Up to 5% of a tube for intravenous use will disappear into the patient when chemicals leach out and bisphenol A, used in plastic bottles, plastic cups and cans may interfere with fertility.

In this context it is interesting to note that a researcher just as Moore, despite his discovery, encounters similar obstacles in the process between discovery and dissemination of knowledge. I know it too well. Moore had the same experience. You will be frustrated by the unwillingness to understand what you are saying. The system is slow, often not entirely free of interest of different kinds. New knowledge will often be delayed a long time before it will be acknowledged.

Moore tells us that our small choices have a significant impact on the future of oceans. It is not about banning plastic. There are many positive uses of plastic containers (such as improved durability and greatly reduced CO2 emissions compared to traditional materials). Today up to 10% of world oil production goes to the manufacture of plastics and a new generation of plastic is coming. A new generation that will not require so much fossil fuels. We are still far from solving the problem of degradable bottles in marine systems.

The second message is perhaps a bit more shocking. It is not just climate change that will change our world. Plastic is perhaps just as serious a threat to the oceans.

The book is mostly aimed of an American audience, especially the ones who live on the West Coast. Are you interested in the basic story about the plastic problem in society and the effects it can have? Then I think you should read the book.

Littering is a problem for all the oceans of the earth. The North Sea and the Baltic Sea are far from healed of littering. In fact the problem is quite large, for example in the west coast in Sweden. Unfortunately it has not been recognized to any great extent. Below are two pictures from Lysekil. They are taken at Christmas Day 2011 and shows abandoned fishing nets and general debris that were washed on shore after storms just before Christmas.



Nets which entangled itself in a trunk

Debris washed up after a storm. Much of it is wood, which rapidly disintegrates. The rest are various types of plastics, which do not break down, cans, bottles, gloves, shoes, ropes...

### **Is the wine bottle of glass a polluter?**

Michael Mölstad argues in the newspaper Svenska Dagbladet that we should buy less wine in bottles made of glass. Instead, he thinks that we should look for other alternatives, either in the case of imports in bulk and bottling closer to the consumer, or for example wine in boxes in certain contexts. I do not think either option is good, because they limit the selection a lot. But is it really that bad with wine bottles? Michael is right that they weigh a lot. The extra weight you must carry, the more fuel and more emissions of greenhouse gases. Not only that.

Often when a package is heavy in relation to the contents the carbon footprint becomes still larger compared to a package of material that weighs less and takes less space.

I would argue that this analysis is only half way through. We can agree that the bottles are costly to transport. But today, let's be honest, what's the alternative? If we do not have glass bottles there is really only one option that will sweep the floor with everything else; plastic. Plastic bottles have a much lower carbon footprint per transported unit. They are thinner and therefore more liters of wine could be shipped by boat, plane, train or truck. This in turn means that more wine bottles can be carried by any cargo transporter and with reduced carbon dioxide emission per liter of wine transported.

Here, we could stop the analysis. But I choose not to stop here. The question is whether this is better for the environment. It sounds really good with less carbon and more goods are transported. It is also why plastics have become so popular in our society.

If we think further, that plastic for biggest part is made from fossil fuels. Between 4-5% of world oil is used to produce plastics. In addition, approximately the same amount of energy is used in plastic factories. Thus about 10% of oil goes to produce plastics, everything included. We can only dream of the day when plastics are made from other materials and we're still not there. We are closer, but it's still a long way to go.

Plastics don't disappear in the nature. All the plastic ever made, aside from a few percent, which was burnt, still exists on our planet. Nature cannot on realistic timescales degrade plastics because it is an artificial material which has no counterpart in nature. Bacteria can slowly, slowly break down the polymers into carbon dioxide, but it takes hundreds, even thousands of years before a plastic bottle disappears. And it is under ideal conditions. Such a thing does not exist in nature.

By extension, it means that more and more plastic would come into the countryside, instead of wine bottles made of glass. Bag-in-box already has this problem because they are made out of plastic. Plastic litters which are killing millions of birds, fish, seals, dolphins, yes, even camels in the desert. Plastic bottles that are transported over long distances contaminate all corners of the earth. Over time, it falls apart into smaller pieces, but it's still plastic.

Environmental toxins are sucked up by plastic bits, and fish eat the plastic in the belief that it is food. Pieces attach in the food-intestinal ducts, leading to starvation and death, but environmental toxins can also bio accumulate and pose a threat later on, higher up in the food chain.

The only way to get rid of the plastic is to burn it. We are good at that in Scandinavia. About half of our trash is incinerated. But in Scandinavia it is also an anomaly in waste handling.

Almost no other countries are burning so much waste. Most of it is either recycled or disposed somewhere on land. The latter is the most common throughout the world.

Plastic advocates say that it also takes time for glass to decompose in nature and that it cannot be incinerated. Yes, that's true, but the glass is a more natural material which is almost never transported long ways in nature. In the sea it will drop to the bottom. It is not optimal, but on the other hand, it is better that it stays close to emission sources than it is spreading everywhere. And of course, the glass does not burn so easily, but it can easily be recycled into new bottles.

But we must nevertheless remember that the main culprit with greenhouse gases is still your transport. The majority of all greenhouse gas emissions throughout the life cycle of the

bottles are when you take your car back and forth and to the store. Think about that next time you use your car.

### **Avoid buying plastic bottles!**

Dare to refuse plastic, come in # plastic riot.

[http://www.supermiljobloggen.se/2012/04/tanja-dyredand-jag-startar-plastriot.html?utm\\_source=dlvr.it&utm\\_medium=twitter&utm\\_campaign=supermiljoblogg](http://www.supermiljobloggen.se/2012/04/tanja-dyredand-jag-startar-plastriot.html?utm_source=dlvr.it&utm_medium=twitter&utm_campaign=supermiljoblogg)

Some time ago I attended an inspiring seminar for environmental students at Gothenburg University. It was obvious that they were inspired and had ideas for how they could shape their future.

The attendance was good, the atmosphere was great and we had a really good dialogue with each other. I really hope the students felt the same. I got several new ideas for my private life and for my blog. During the seminar, I had occasion to highlight some of the environmental problems facing the ocean. One of my main areas is marine debris, especially plastics.

Without hesitation I can say that this is an environmental issue that is still full of surprises. Even to environmental scientists. Most people know that garbage is a problem for the ocean, but maybe not that it is such a big problem as it actually is. We have ignored it a long time. It is time to do something about it. What shall we do? Show that you want to reduce the amounts of plastic! Tell us how you think we should switch to a decent plastic economy and reduce our plastic dependency.

More than 95 percent of stormbirds in the North Sea have swallowed so much plastics that the amount corresponds one of your snacks. Each year an unknown number of seals and birds are drowning after being entangled in plastic nets.

The plastic problem in the Pacific has received much attention. The situation is so serious that two-fifths of newborn albatrosses suffocate to death due to plastic pieces before the age of one year. Fry in deep oceans is believed to eat the same amount of plastic that would be equivalent to one billion plastic bags. Some beaches in Hawaii consist of upwards of 60 percent plastic regrind.

We suffer from a plastic addiction. What is not made entirely or partially of plastic? I can almost guarantee that you touch any type of plastic right now. Presumably, you are not even aware of it.

More plastic than meat is made. In Sweden we use 2-3 billion plastic bags every year, globally 500 billion to 1 trillion. Even if only a few percent will end up in the nature it is a disaster! Every year hundreds of tons of debris are washed up on Swedish shores, which cost too much money for already strained municipal budgets. And now we can also add all the thousands of plastic particles in each cubic meter of water around the coast. These particles absorb toxins that can accumulate in the food chain.

Plastic is also a paradox. In the right place, it is a fantastic material. It can reduce fuel consumption of cars, airplanes or other vehicles built out of plastic. Greenhouse gas emissions are less with lighter plastic packaging. In health care we can get sterile, flexible hoses, bags for infusion and blood, to produce machines that save lives and artificial organs. At natural disasters we can quickly distribute safe food and drink to the victims. Water in

PET bottle probably saved hundreds of lives after the tsunami wave in Japan a year ago. But is it a good idea that almost everything in your everyday life is made of plastic? Other materials can probably do the same job just as well.

It is never about banning plastic, it is about using it in a smart way. Somewhere we crossed a boundary. And as we all know it is an incredible addiction damaging in the long run.

<http://www.telegraph.co.uk/earth/environment/5208645/Drowning-in-plastic-The-Great-Pacific-Garbage-Patch-is-twice-the-size-of-France.html>

**Video with Charles Moore, TED talks, author of "Plastic ocean"**



<http://www.youtube.com/watch?v=FrAShtolieg&feature=related>

**Some pictures showing the problem**

[http://www.youtube.com/watch?v=CzkgaUjIueY&feature=player\\_embedded](http://www.youtube.com/watch?v=CzkgaUjIueY&feature=player_embedded)



