A Personal Viewpoint

April 2009

Prepared by Stuart Greenfield

Is it time for a change?

In the pages to follow you will find…

"It is a curious situation that the sea, from which life first arose should now be threatened by the activities of one form of that life. But the sea, though changed in a sinister way, will continue to exist; the threat is rather to life itself." – Rachel Carson, from her book, *The Sea Around Us (1951)*

This Paper Deals With Plastic Waste…

that is, the ubiquitous plastic container that is eventually thrown away, whether it be the plastic bag offered at the supermarket and other stores, or the plastic container holding the all-too-common "bottled water" that is given out at certain events or is bought by the dozen or so, or the plastic packaging of all kinds of items purchased at shopping malls – all of which eventually becomes plastic waste.

I hope you will allow me to share with you what I have learned over the past year or so about the ever growing problem caused by plastic waste. But first…

On its two-dimensional surface this paper appears to simply contain some text, a few photos, a pair of maps, and a chart. But it also contains what I think of as a third dimension – web addresses that are an important integral part of what I offer you on the subject – web addresses to a number of videos, a few articles, and the animation of one of the aforementioned maps.

There is a great deal of material in the public domain on the subject of plastic waste. I have tried to select a reasonable subset of the seemingly well-documented material found on the Internet. Any differences in viewpoint on the subject appear to center around details rather than whether a plastic waste problem exists.

After reading and viewing the contents of this paper you may agree with me that the idea that we "throw away" plastic waste has no meaning. And that "out of sight, out of mind" is not an environmentally sound way to deal with plastic waste.

If you would like to investigate further for yourself, simply type into Google (or any other search engine) a phrase such as *"plastic waste"* or *"plastic bags"* or *"North Pacific Gyre"* and let the Internet take you where it may. Any comments you wish to share with me on the subject of this paper are welcome. Simply email me at sbgreeny@earthlink.net. And, if you find what lies within these pages of value, feel free to forward it to your family and friends.

Courtesy of Jon Sullivan (PDPhoto.org)

Captain Moore's Plastic Discovery

Charles Moore* is no stranger to water monitoring and research. While returning from a 1997 yacht race from California to Hawaii, he veered off from the usual traffic lane and came upon quite a sight. Later, explaining what he saw Captain Moore said, "…there were shampoo caps and soap bottles and plastic bags and fishing floats as far as I could see. Here I was in the middle of the ocean, and there was nowhere I could go to avoid the plastic."

Subsequently, that area of the Pacific has become known as the Great Pacific Garbage Patch and is located within the North Pacific Gyre – one of five ocean gyres** on Earth (see the map on the right).

*Charles Moore founded in 1994 Algalita Marine Research Foundation (AMRF). You can see the work he and his staff have been doing by going to the Foundation's website at: http://www.algalita.org/.

**gyre – As used here it is a spiral oceanic surface current driven by the prevailing winds.

Plastic Waste And The North Pacific Gyre

So where did the waste – plastic or otherwise – found in the Great Pacific Garbage Patch come from? Was it garbage thrown off the bow of ships passing nearby? Or was it nets abandoned by commercial fishing boats (as shown to the right)? Or was it waste that floated to the gyre from the shores of California's coastal communities?

C.Vanderlip/AMRF

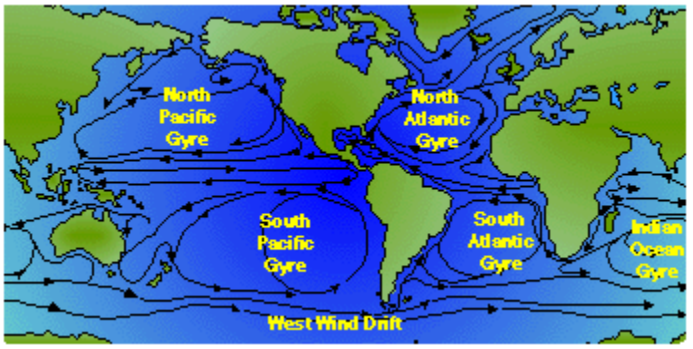
Yes, in part, it does come from ships, fishing boats, and shoreline communities. But it also comes from other sources as well. It comes from all the rivers that flow into the Pacific. And it comes from the streams, lakes, and ponds that feed those rivers. Some waste may even come long distances over land, finally settling into one of those streams that flow into a lake, pond, or river and on into the Pacific Ocean.

*Here are a few facts** *to ponder:* Less than 5% of plastic waste is recycled. Though 20% of the plastic found in the ocean comes from ocean sources such as fishing nets, 80% comes from land – from the rivers, lakes and ponds, and streams as described above. Roughly 10% of the plastic debris found on beaches is plastic pellets lost during industrial processing of plastic items.

The following three videos will offer you an important visual glimpse into the plastic waste problem in the North Pacific.
1. An interview with Charles Moore: http://www.youtube.com/watch?v=n7Nn-mUfSBU.
2. Jean-Michel Cousteau on the coast of a small Pacific island: http://www.youtube.com/watch?v=PIl7zl_9fTA.
3. A presentation given by Charles Moore: http://www.ted.com/index.php/talks/capt_charles_moore_on_the_seas_of_plastic.html.

* Obtained from Algalita Marine Research Foundation literature.

The Five Ocean Gyres



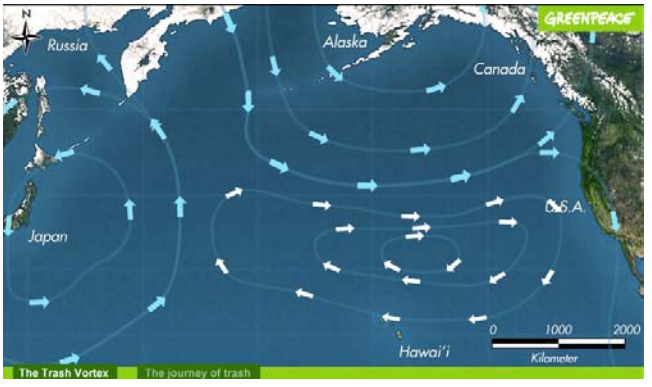
Courtesy of Algalita Marine Research Foundation

A North Pacific Gyre Animation

This animation is a simplified demonstration by Greenpeace as to what is taking place in the North Pacific with regard to winds and surface currents. Its blue-arrow circulations (see the map below) may be somewhat different than other renditions as evidenced by the Algalita map shown above. But it does offer a demonstration of how the Great Pacific Garbage Patch came into being.

As the website (given below) comes up you will see the map shown below with the arrows circulating. The cluster of white arrows represents The North Pacific Gyre. In order to see the gyre's affect on plastic and other waste that makes it to ocean shorelines simply place your mouse over the phrase, *The journey of trash*, click and drag the arrow found below the phrase, *6 months*, to the right.

http://oceans.greenpeace.org/en/the-expedition/news/trashing-our-oceans/ocean_pollution_animation.



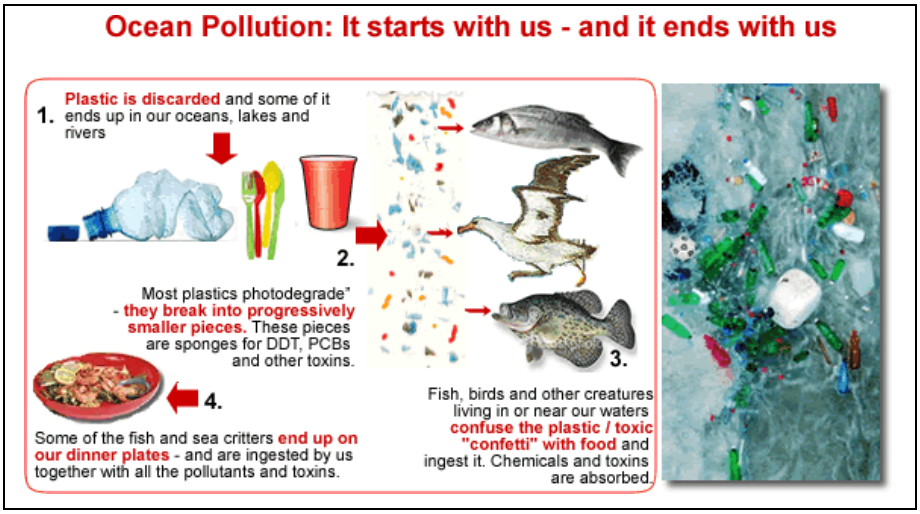
Courtesy of Greenpeace

You Might Ask…

"How does all of this information about plastic in the Pacific Ocean affect us who are living east of the continental divide?"

Well, the North Atlantic Gyre (see **The Five Ocean Gyres** map on the previous page), also called the Sargasso Sea, holds an accumulation of floating brown seaweed of the genus *Sargassum*. First noted by Christopher Columbus in 1492, today the North Atlantic Gyre accumulates plastic waste along with its brown seaweed.

And so, we, who live in the east, are looking at the same plastic waste problem as those living in the west – the only difference being, there has been no east coast equivalent of the west coast's Captain Moore and the Algalita Marine Research Foundation.



Reprinted by permission of Sibylle Faye, Webmaster, AvianWeb.com
http://www.avianweb.com/plasticinouroceans.html

The Threat To Wildlife From Plastic Waste

Over the weeks and months that plastic waste is floating in the ocean, it is subjected to sunlight. As the weeks and months go by it begins to break down into smaller and smaller pieces. These plastic fragments resemble krill* or other small ocean animals (zooplankton**) which are at the base of the ocean's food chain and fish, birds, and young sea turtles may eat them. And, some of the plastic fragment-eating fish may wind up on our dinner plates, as depicted in the chart above which shows how plastic waste that *starts with us – ends with us*.

Furthermore, bottle caps, cigarette lighters, and other like-sized pieces of plastic that were pointed out in the Jean-Michel Cousteau video cited on the previous page, may be fed to Albatross chicks – all too often with fatal consequences. A video of a necropsy*** of an Albatross chick is offered at the following web address: http://www.youtube.com/watch?v=FinDNPopXQY.

An Albatross Chick Carcass
Cynthia Vanderlip/Algalita Marine Research Foundation

* krill: shrimp-like crustaceans
** zooplankton: small animals that drift on the surface of the ocean
*** necropsy: dissection of a dead animal, usually to determine why it died

Plastic Bag Bans, Deposits, Taxes, Charges

Most every plastic bag we get from stores today is made from petroleum unless you live in one of the places that has banned such bags. As noted previously in videos, over time, a chunk of plastic breaks down into smaller and smaller pieces until the pieces are the size of dust particles. And yet it persists. Most of the plastic made today is forever. Virtually every piece of plastic ever made is still in existence somewhere on Earth.

Because of this persistence of petroleum-based plastic there are quite a few municipalities, states, and countries that have chosen to deal with the plastic bags used to carry purchases out of stores by outright banning the plastic bags, or placing deposits on the plastic bags, or taxing the plastic bags, or having stores simply charge customers for each plastic bag they need – and other municipalities, states, and countries are contemplating doing the same.

To read about some of the plastic bag bans around the world go to the following website and, in particular, check out the column headed, *Plastic Bag Laws Spread*: http://www.npr.org/templates/story/story.php?storyId=89135360. And here's a one minute video from National Geographic: http://www.youtube.com/watch?v=gOsmUJABdWw. In another video we have a news report on San Francisco's plastic bag ban and the fact that it is encouraging the use of biodegradable plastic bags, a subject looked at briefly on the next page: http://www.youtube.com/watch?v=YVPEobrkpI4.

Ways For All Of Us To Reduce Plastic Waste

We could bring our canvas bags to the grocery store and other stores so that when asked the question, "Paper or plastic?", the answer could be, "Neither! I brought my own." (Many stores sell canvas bags at a modest price. Canvas bags are sometimes given out free at some fairs, conferences, exhibitions, and by a number of organizations.)

We could take a few of those plastic bags we already have in our homes to the grocery store instead of coming home with new plastic or paper bags.

We could avoid purchasing water in plastic bottles and urge organizations not to supply them at meetings, conferences, etc. (What ever happened to the good old pitcher full of water and glasses?)

We could do our best to avoid using plastic cutlery and plastic plates or plastic-coated paper plates.

We could recycle as much as possible of that unavoidable plastic packaging that we wind up taking ownership of when we buy items at the store.

We could urge our local politicians through letter, email, or phone to study the desirability of enacting a plastic bag ban, deposit, tax, or charge.

We could join clean up volunteers on Earth Day each year, but we could also keep our little piece of public or private roadway clear of plastic and other waste during the rest of the year even if others left it there.

And, beyond plastic waste, **we could** work toward having a greater amount of our household waste either being able to be placed in a compost pile or a recycle bin.

The Biodegradable Plastic Alternative

Biodegradable plastic, much of which is currently made from corn is discussed in the following video: http://www.youtube.com/watch?v=UyDdRe9EkSE.

You can also read about biodegradable plastic and the companies making it at the following website: http://www.usatoday.com/money/industries/manufacturing/2008-12-25-biodegradable-plastic_N.htm.

Can All Waste Be Turned Into Usable Products?

There is a growing amount of research being done by private companies on the conversion of all waste into usable products such as construction materials and fuel. For example, a video produced by one such company, InEnTec, LLC can be seen at web address: http://www.youtube.com/watch?v=soYpZIPkjDs.

What Some High School Students Have Been Doing

Three students, who have been working on the environmental problem with plastic waste, are briefly introduced here. I have been made aware of them through the media – the first two through recent articles in local newspapers published in Ulster County, New York and the third through my research on the Internet.

There are certainly many other students, both local and non-local that have been working on the environmental problem with plastic waste as well as other important environmental issues.

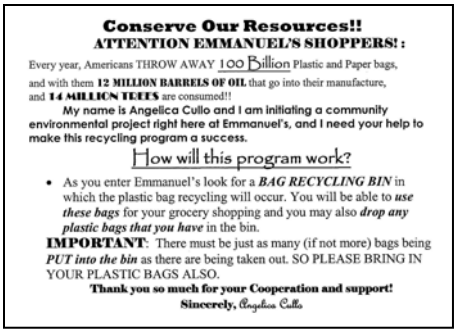
Here is a brief introduction to the work of the three students:

Je' Nae Potter, a Saugerties High School student, because of her interest in recycling, has been appointed to the Ulster County Recycling Oversight Committee.

She is working through that committee to increase awareness of the impact of plastics on the environment and is encouraging the use of reusable cloth bags for shopping.

The March 30, 2009 edition of Kingston's Daily Freeman had a front page article on Je' Nae's work and appointment to the Recycling Oversight Committee for a term of three years as a member-at-large.

Angelica Cullo, a Rondout Valley High School student, has set up a recycling bin at Emmanuel's Marketplace in Stone Ridge, NY. As her handout indicates, shown on the right, shoppers can take plastic bags out of the bin and use them at the checkout counter instead of using the new paper or plastic bags offered by Emmanuel's. Shoppers may also drop their excess plastic bags in the bin for others to use.



Conserve Our Resources!!
ATTENTION EMMANUEL'S SHOPPERS!:

Every year, Americans THROW AWAY 100 Billion Plastic and Paper bags, and with them **12 MILLION BARRELS OF OIL** that go into their manufacture, and **14 MILLION TEETS** are consumed!!

My name is Angelica Cullo and I am initiating a community environmental project right here at Emmanuel's, and I need your help to make this recycling program a success.

How will this program work?

- As you enter Emmanuel's look for a ***BAG RECYCLING BIN*** in which the plastic bag recycling will occur. You will be able to ***use these bags*** for your grocery shopping and you may also ***drop any plastic bags that you have*** in the bin.

IMPORTANT: There must be just as many (if not more) bags being ***PUT into the bin*** as there are being taken out. SO PLEASE BRING IN YOUR PLASTIC BAGS ALSO.

Thank you so much for your Cooperation and support!
Sincerely, Angelica Cullo

The March 20, 2009 edition of the Blue Stone Press had a front page article on Angelica's bag-recycling initiative at Emmanuel's.

And then there's **Daniel Burd**. While attending classes at the Waterloo Collegiate Institute in Waterloo, Ontario, Canada, he took first place at the 2008 Canada-Wide Science Fair in Ottawa for his work with bacteria that eat plastic bags. His award winning work has been reported on extensively and there seems to be quite a bit of interest in Daniel's work in the scientific community. Time will tell whether this line of research will be fruitful.

Here is the web address of an article about Daniel published on May 22, 2008: http://news.therecord.com/article/354044.

If you would like to see what Daniel's project entailed he has posted his paper on the Internet at web address: http://www.science.uwaterloo.ca/WWSEF/08Awards/08BurdReport.pdf.