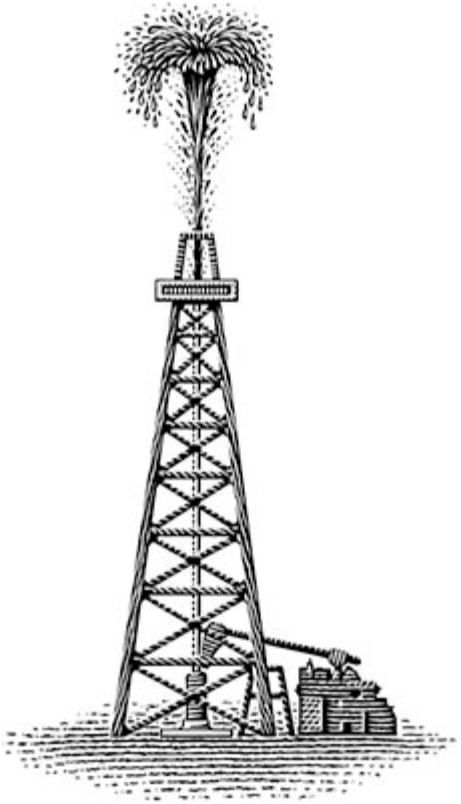
The Problem with Fossil Plastics



by Sustainablebizness.com

Special Thanks to the

Algalita Marine Research Foundation (AMRF)

For significant contributions to this summary presentation, and for their stewardship.

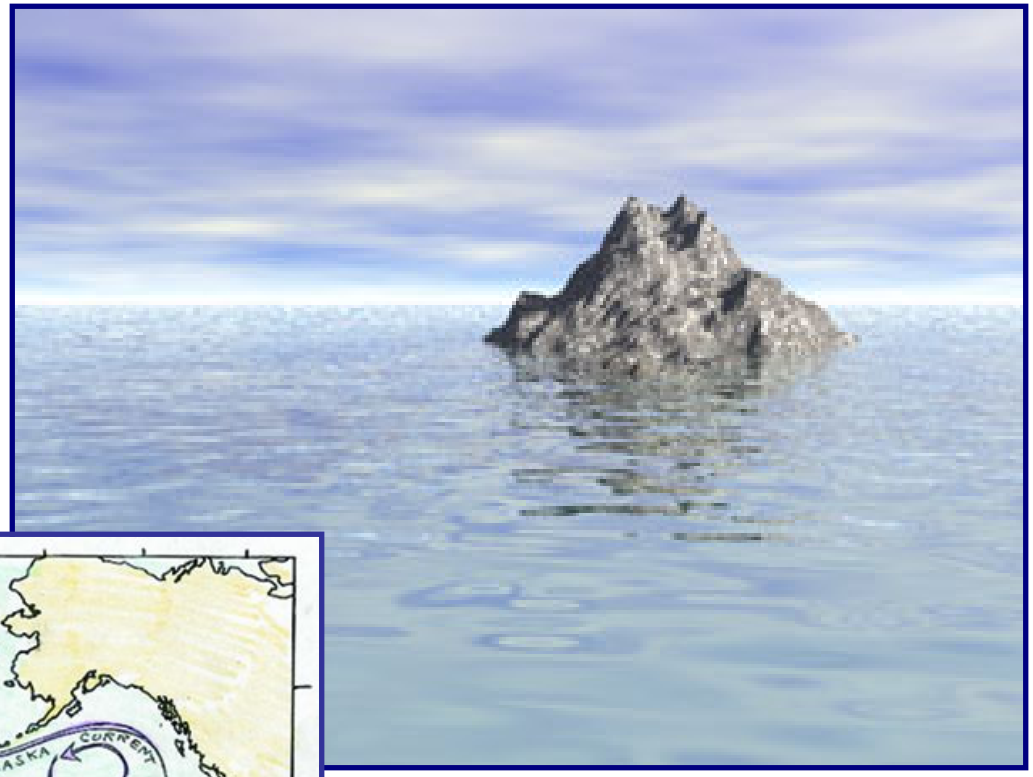
Fossil Plastic is Polluting our Ecosphere at an Alarming Rate

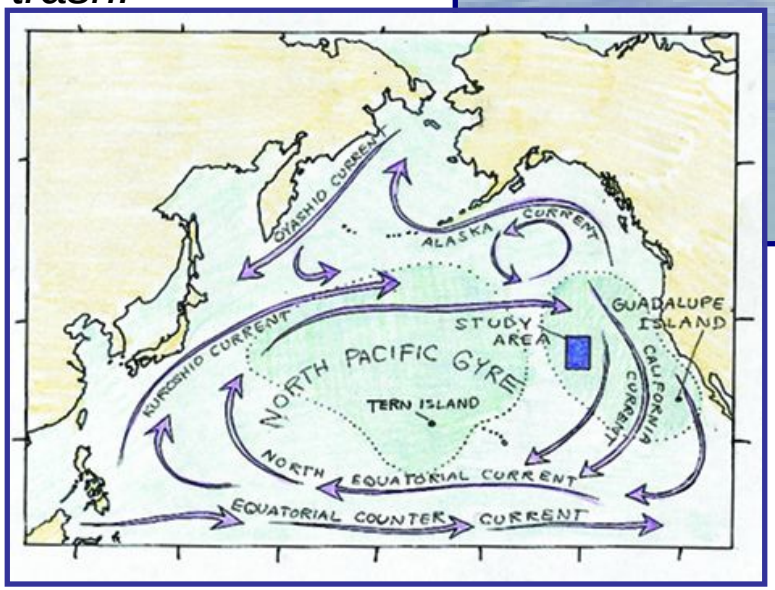
We can't close our eyes anymore and pretend it "goes away".

It doesn't go away- "Every piece of fossil plastic ever manufactured still exists!"

Garbage Island in Pacific Ocean

An entire "island" composed of trash has been discovered in the Pacific Ocean between California and Hawaiian islands . It is as large as the Central Europe. Fossil plastic objects prevail among the trash.





Plastics are Forever

Fossil plastics, like Diamonds are forever.
-Captain Charles Moore (AMRF)

"An estimated 500 billion to 1 trillion bags are used annually worldwide.

100,000 whales, seals, turtles and other marine animals are killed by plastic bags each year worldwide."

(source Planet Ark)

Marine Preserve in the Pacific Ocean Kure-Atoll

In Hawaiian traditions, the Northwestern Hawaiian Islands are considered a sacred place, a region of primordial darkness from which life springs and spirits return after death

(Kikiloi 2006).

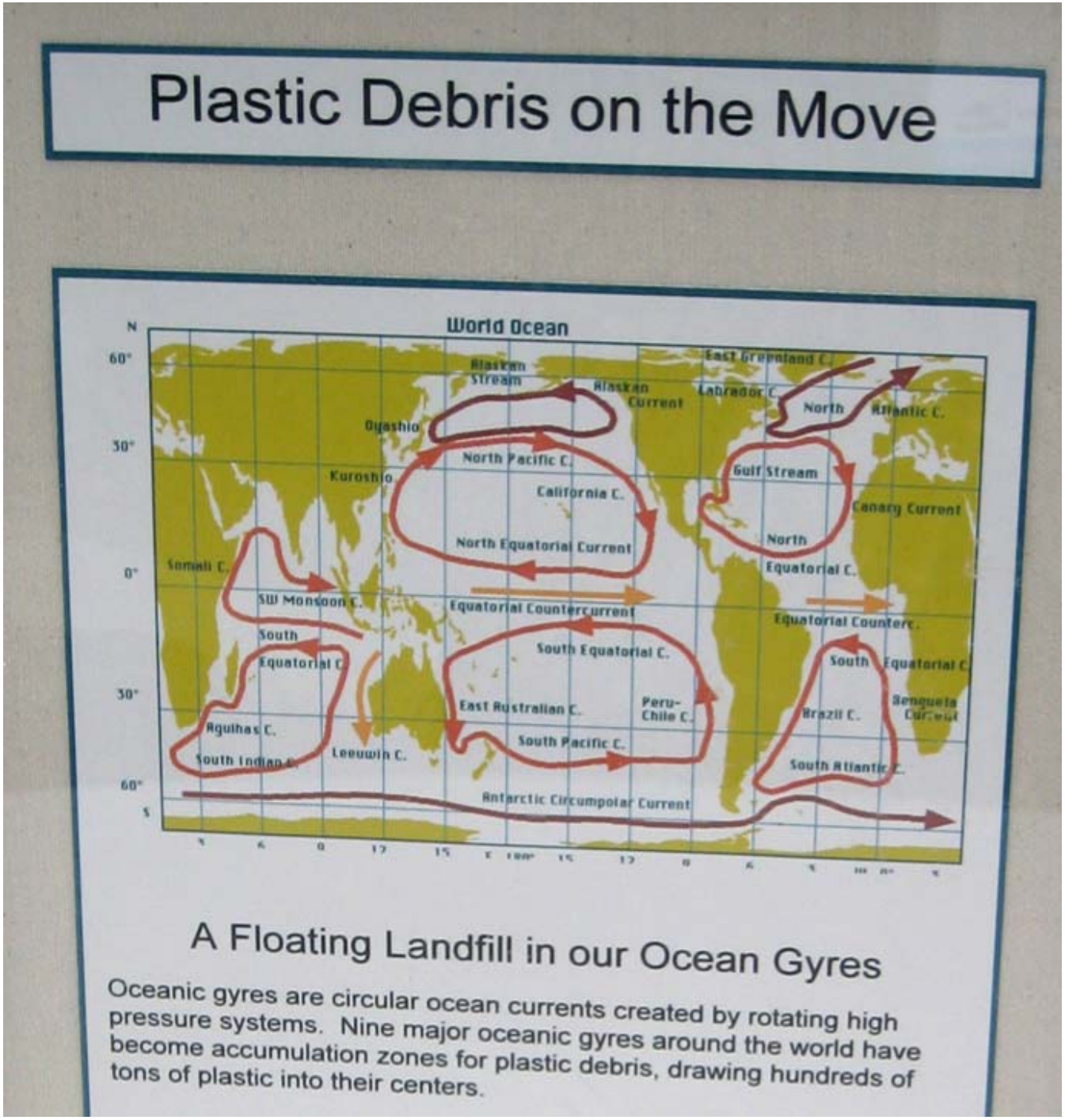
Kure-Atoll Albatross and the trashed beach

Land and Sea are Inextricably Connected

"The recent news on the extent that plastics are killing sea animals and birds will finally raise the human health issue through the environmental focus."

Culturechange.org

Albatross carcass on Kure-Atoll Marine Preserve

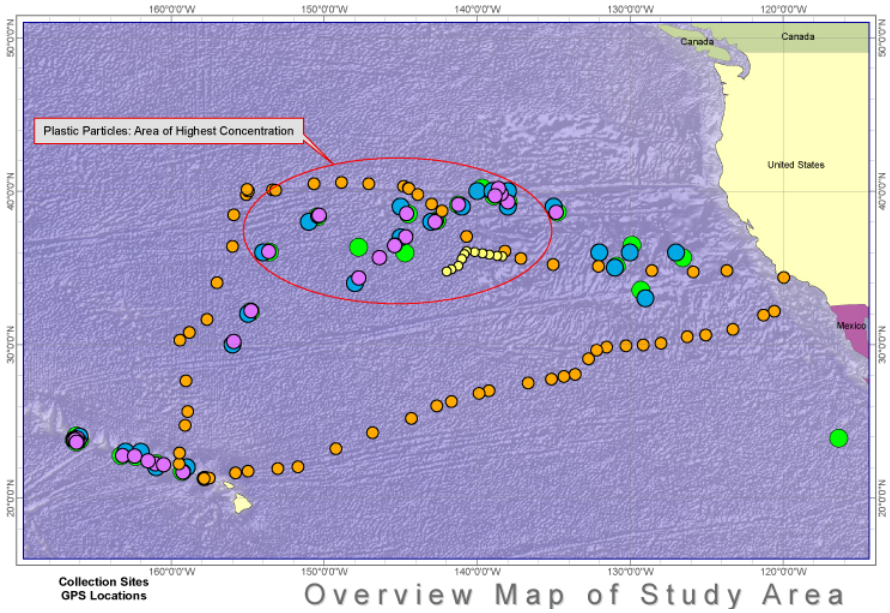


Circular oceanic currents (Gyres) around the world have drawn hundreds of tons of plastics to their centers.

From AMRF

Plastic More Abundant than Plankton in the North Pacific Gyre

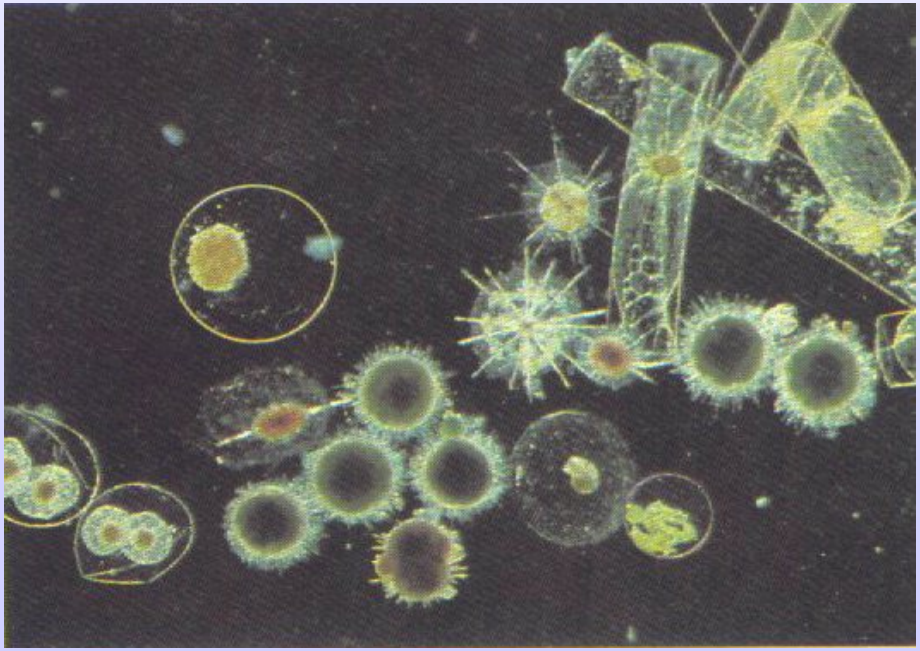
Ocean water samples collected between California and Hawaii contained plastic debris and minute plastic particles that were **six times** as prevalent weight-wise than plankton.



Plankton is at the Bottom of the Food Chain

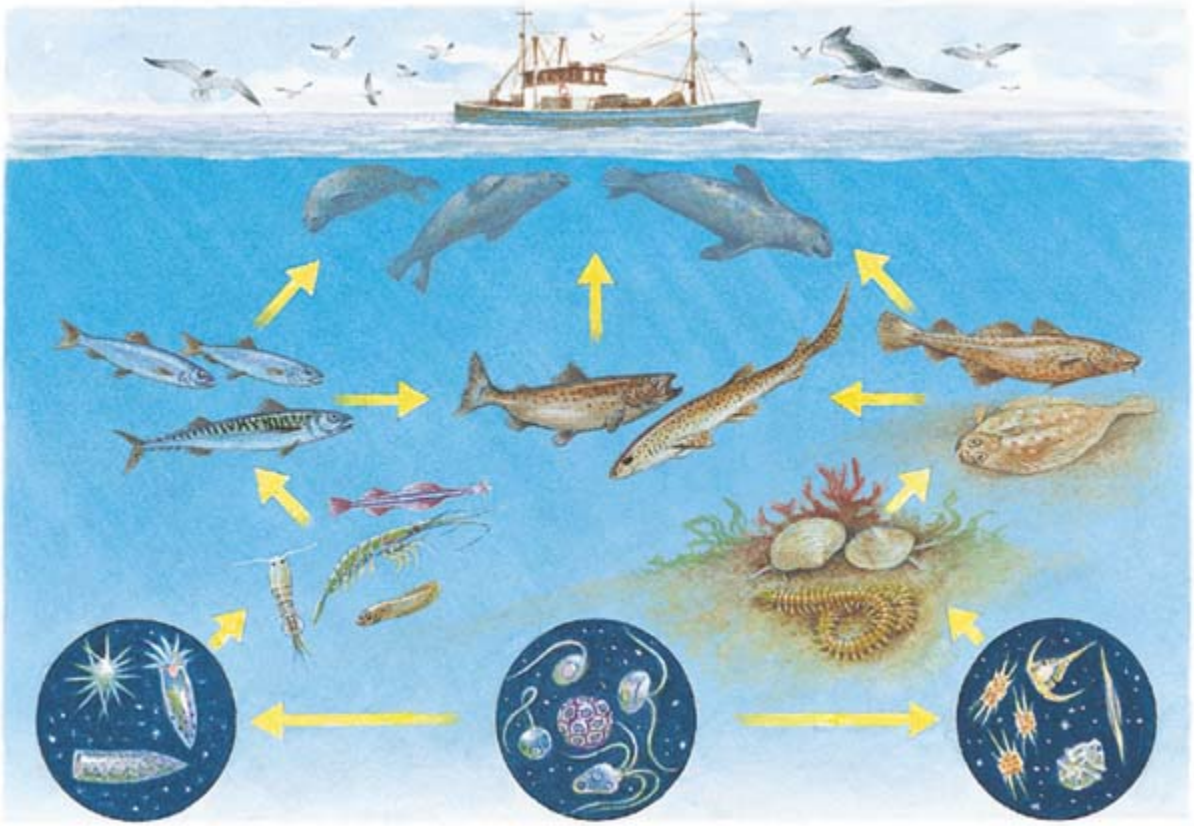
"Plankton" is made up of a large variety of both plant and animal species, all of which are very small. Many small fish and other sea life consume plankton by sucking in large amounts of water.

Along with plankton, they can ingest large amounts of fossil plastics and its contaminants.



Plastic Toxins Move up the Food Chain

All life in the sea depends on plankton. Small fish and crustaceans eat this plankton in order to survive and grow. They, in turn, are eaten by bigger fish. Then we eat fish.



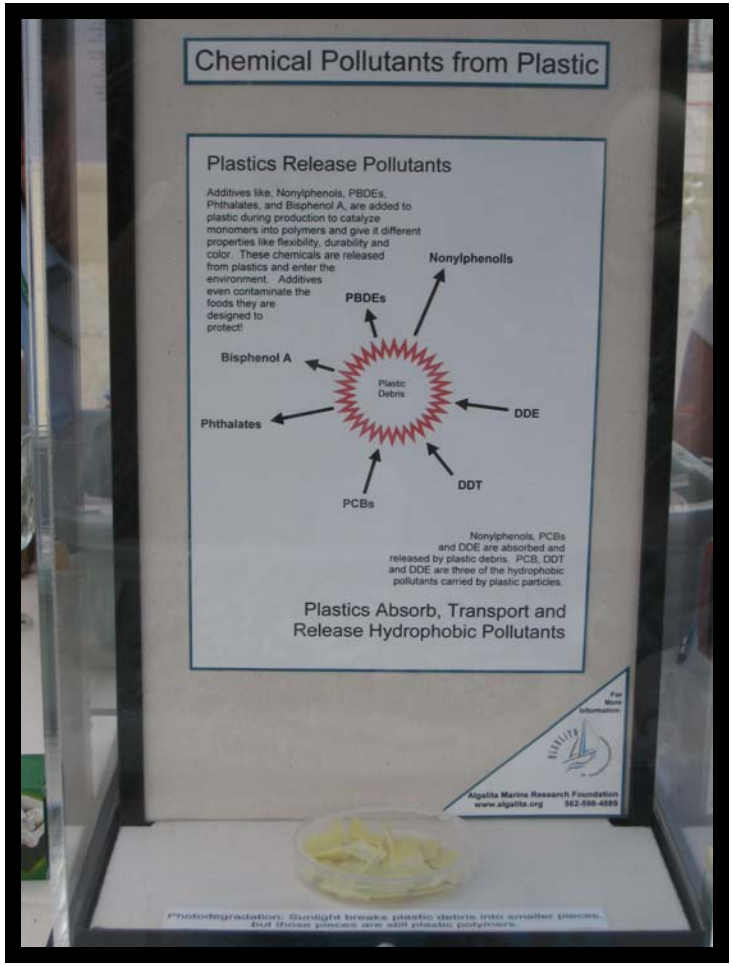
Biomagnification refers to the increase in concentration of a contaminant at higher levels of the food chain.

(Good explanation of this at : http://www.itk.ca/environment/contaminants-wildlife-humans.php)

Fossil Plastics Break Down into Smaller and Smaller Particles that Pervade the Ocean Waters

Because fossil plastics do NOT biodegrade, no naturally occurring organisms can break these polymers down. Fossil plastic always remains a polymer. When fossil plastic debris meets the sea it can remain for centuries causing havoc in our ecosystems.

Harmful Chemicals in Plastic



Fossil Plastics Absorb, Transport, and Release Toxic Pollutants

Additives like Nonylphenols, PBDEs, Phthalates, and Bisphenol A are added to plastic during production to catalyze monomers into polymers and give it different properties like flexibility, durability and color. These chemicals are released from plastics and enter the environment.

Other dangerous chemicals that have persisted in the environment despite having been banned decades ago, are absorbed and released by plastic debris, like **PCB, DDT and DDE.**

“ Despite the fact that the use of DDT and PCB was banned at the end of the 1970s–early 1980s, dolphins were still found to carry moderate to high levels of these chemicals in their tissues.”

-A. Aguilar, and A. Borrell, Department of Animal Biology, Faculty of Biology, University of Barcelona 2004

We are Inextricably Connected

"Chemical Linked to Birth Defects - Bisphenol A - Found at Unsafe Levels in Canned Food:

Plastics Compound Highest in Soup, Pasta, Baby Formula"

-From a report released by Environmental Working Group

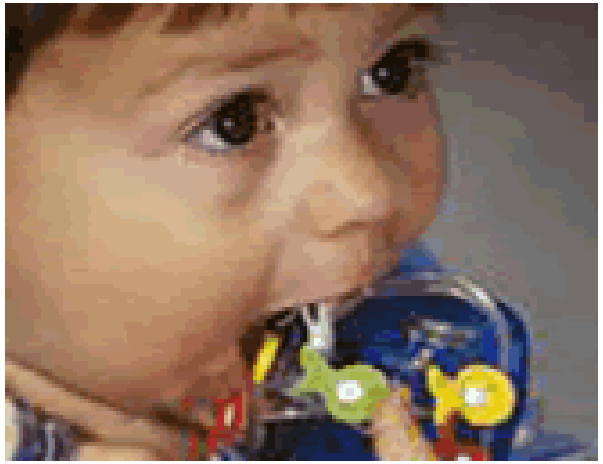
See the full EWG report released March 5, 2007at:
http://www.ewg.org/reports/bisphenola/execsumm.php

"It's true that substances used to make plastics can leach into food," says Edward Machuga, Ph.D., a consumer safety officer in the FDA's Center for Food Safety and Applied Nutrition.

Studies Link Phthalates to Multiple Human Ailments

- PVC contains plasticizers (usually phthalates) as well as toxic "stabilizers" such as lead and cadmium.

- Studies have linked various phthalates to abnormal male sexual development, male infertility, premature breast development, cancer, miscarriage, premature birth and **asthma.**



Soft children's toys, including those meant for teething, are usually made from PVC.

Our Plastic Stuff

What Can We Do About It?

Bill McDonough

“Fossil Plastic is a Technical Nutrient”

“There are two fundamental frameworks for metabolism: biological and technical nutrients. So we ask a company, ‘Are your materials safe and healthy for human and ecological systems? Do you have reverse logistics – do we know where this stuff comes from, where it goes, and how to get it back and it onto closed, zero-waste cycles? ”

Landfill is not the Answer

It gets dumped out in the ocean, it washes ashore, it gets pulled out of the ocean, then do you put it back out in the ocean?

LA Public Works removing debris from the LA River after a storm.

Recycling is not the Answer

It is a deception that the "chasing arrows" on plastic containers imply recyclability and recycled content. The types of plastics and varieties of containers that can actually be recycled are few and far between.

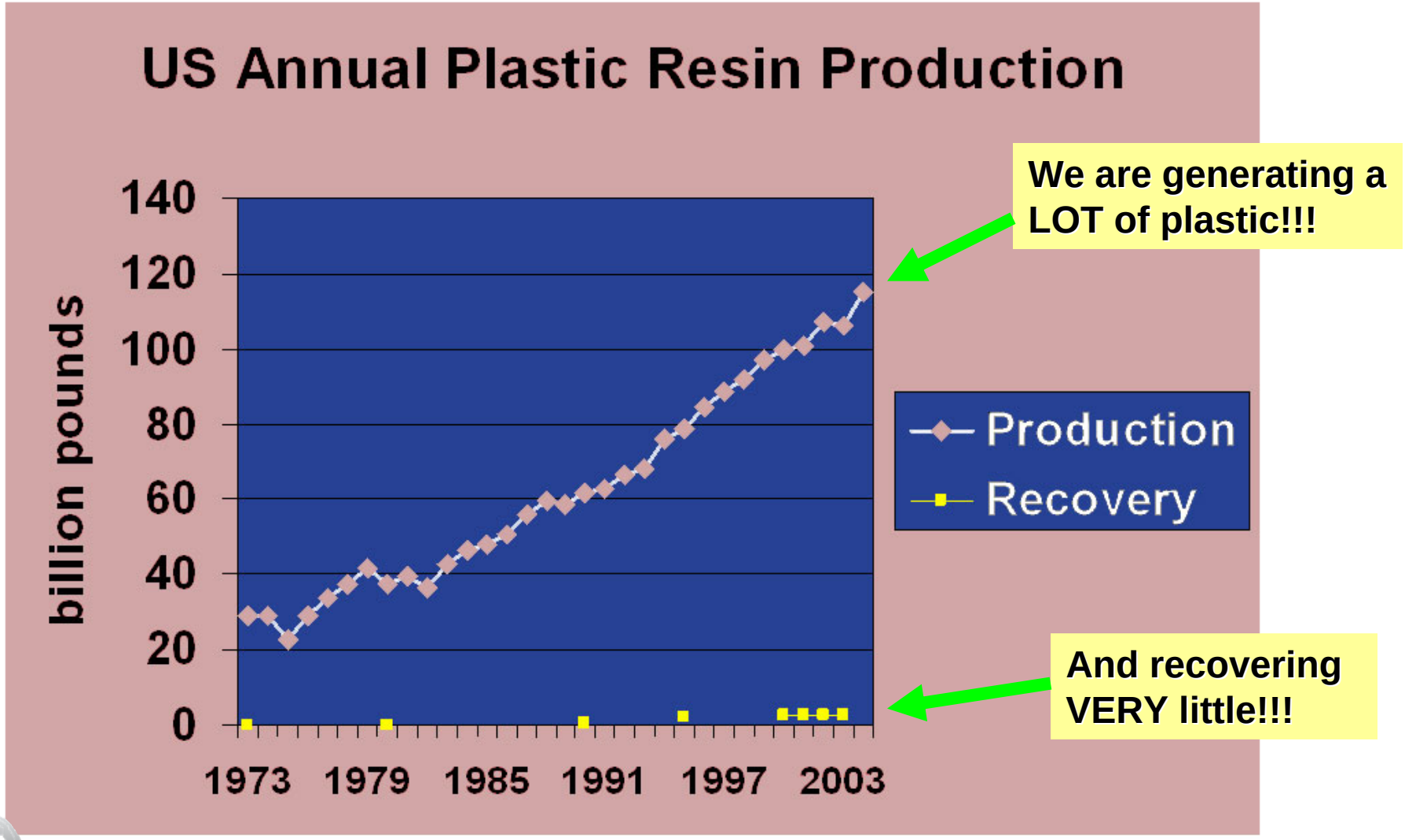
Downcycling

"When rarely recovered, Fossil plastic tends to be downcycled."

You say that recycling, as it's currently practiced, is "downcycling." What we call recycling is typically the product losing its quality. Paper gets mixed with other papers, re-chlorinated and contaminated with toxic inks. The fiber length gets shorter, allowing more particles to abrade into the air, where they get into your lungs and nasal passages, and cause irritation. And you end up with gray, fuzzy stuff that doesn't really work for you. That's downcycling.

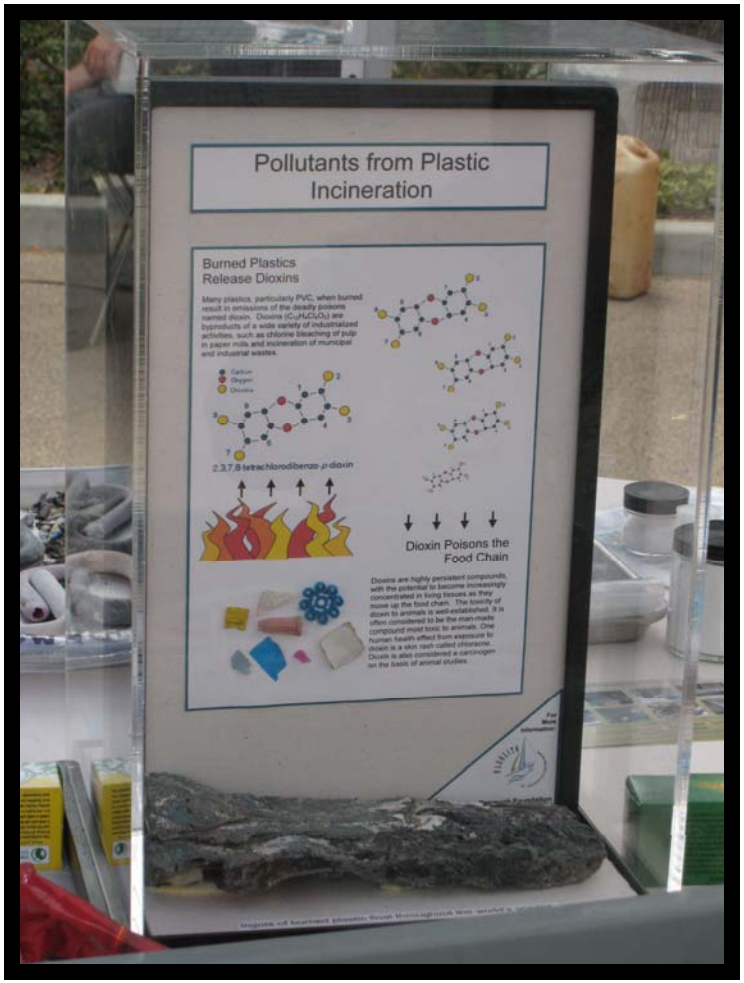
-Cradle to Cradle

Virgin Plastic Production is Still on the Rise



(APC, 2004)

Incineration is not the Answer



Pollutants from Plastic Incineration

Most plastics, especially PVC when burned result in the emission of the deadly poisons named **dioxin**.

Dioxin poisons the food chain.

The toxicity of dioxins to animals is well established. It is considered to be **the man-made compound most toxic to animals**.

So What is the Answer?

Changing Views, Taking Action

Problem:

Plastic Accumulation Worldwide

Plastic doesn't biodegrade. Beaches around the world are inundated with fossil plastic debris.

Solution:

Change How We Think About Plastic

If civilization is to survive healthily and indefinitely on this planet, then we must change the way we create, consume, and discard plastic.

We pack our lunch in a bag that will be around long after we're gone.

So What is the Answer?
Changing Views, Taking Action

Problem:

Culture of convenience

We are a “throw away” society that creates long-term pollution problems in exchange for short-term ease of living. This only burdens the future further.

Solution:

Culture of Sustainability

Buy less. Buy quality products and maintain them.

Share items with your neighbors!

Changing Views, Taking Action

Problem:

Consumer Responsibility

Consumer assumes a majority of the responsibility for the end use of products.

Solution:

Consumer and Producer share Responsibility

Support legislation that encourages producer liability for the end result and true cost of the products.

Producer "Take Back Policies" or "Extended Producer Responsibility".

Changing Views, Taking Action

Problem:

Excess Packaging

Non-recylable packaging.

Solution:

Reduce Consumption.

Buy in bulk. Buy 100% recyclable.

Returnable or reuse-able glass and metal packaging.

Look for green packaging!

What could be Green Packaging?

Infrastructure:

The lack of an infrastructure to close the technical and biological loop present huge challenges to sustainable packaging. This includes few industrial-scale composting systems, many different plastics in the waste stream, sorting problems, underfunded local government programs, etc.

What steps could the grocery industry take to address this "system" issue?

How would we navigate to zero waste?

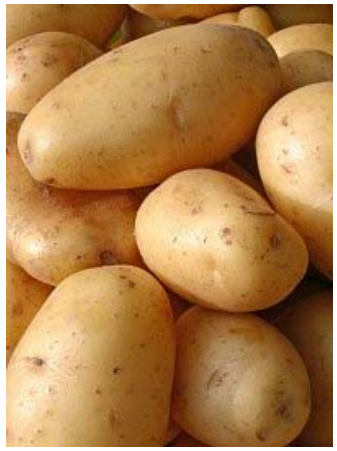
What are Green Plastics?

We learned:

Fossil plastics are 100% HYDROCARBON polymers that DON'T biodegrade in many lifetimes.

Green plastics contain CARBOHYDRATE polymers that DO biodegrade.

It is now technologically possible to make plastics using green cells rather than fossil fuels.



Clarification of Terms

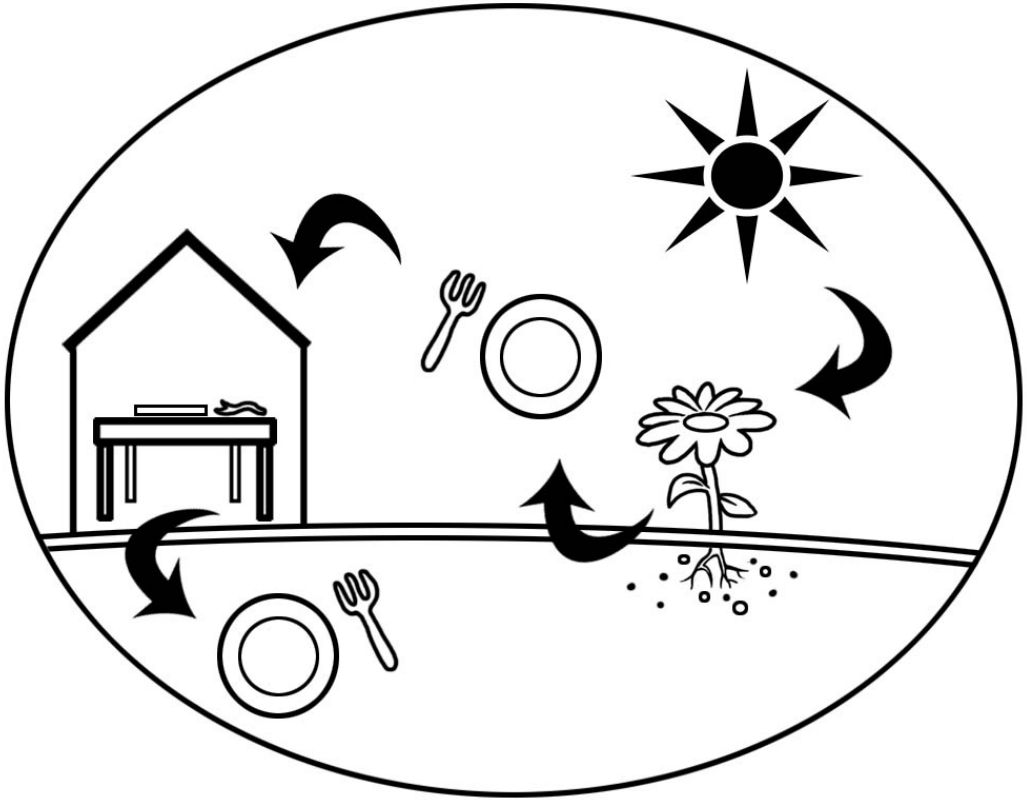
Current Distinctions of Bioplastics

- Bio-Based Plastics- made from biologically derived materials (many are blended with traditional resins).
- Degradable Plastics- break down physically into small pieces
- Biodegradable plastics- meet certain standards (e.g. ASTM) for decomposition into CO2, water, biomass) in specific timeframe
- Compostable plastics- meets standards for industrial composting.
- Home- compostable - suitable for home composting (lacks high temperatures, optimal conditions of industrial composting).

More Stringent Requirements

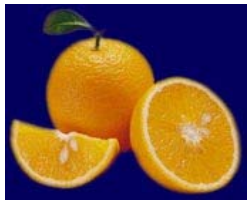
To Stop Accumulation of Waste We Must Focus on Two Principles

1. **Live off current solar income**
2. **There is no waste (waste is food for something else).**

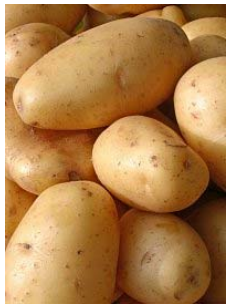


Zero Waste Mission- USDA Ag Service

Commodity






Product

Cheese, juice, ethanol, flour, vegetable oils, biodiesel, eggs, textiles

"Waste"

Whey, pulp, glycerol, feathers, peel, sugar beet fiber

Biobased Packaging

Biopolymers, PLA, PHA, composites, films, coatings, monomers

From USDA Agricultural Research Service- Eastern Regional Research Center: Kirsten Dangaran, Charles Onwulata and John Cherry (Center Director) 2006 "Packaging Films and Coatings"

Carbohydrate Polymers Are Biopolymers

The source for the biopolymer is a green cell.

Biopolymers can be broken down by microorganisms like fungi and bacteria. They can compost and become part of the soil again.

Sources of Biopolymers for Green Plastics

Cellulose (Ag and forest wastes)

Wood

Cotton

Corn

Wheat

Soy

Tapioca

Potatoes

Etcetera

Green Products Now Available

BioBag®

Mater-Bi

EcoWorks

Eco Film
100% BIODEGRADABLE

Greenware

innovia
FILMS

cellulose films

Producers of Green Plastics

The list is growing. For information on compostable green plastics and 3rd party certifiers go to:

US: Biodegradable Plastics Institute

http://www.bpiworld.org/BPI-Public/Approved.html

European Union: DIN Certco Certification

http://www.din-certco.de/index.php?lang=en

Brussels: Vincotte International nv/sa

http://www.aib-vincotte.com

Japan: Biodegradable Plastics Society of Japan

http://www.bpsweb.net/02_english/03_new_e/what_g/what.htm

What Are Other Countries Doing?

- New Zealand has become the first country to adopt a 'Zero Waste by 2020' policy.
- In Finland, a law passed in 1997 aimed to reuse or recycle 82% of packaging waste within the first four years, and prevent another 6% from being created in the first place.
- In Holland, a law effected in 1999 requires computers, appliances and other equipment to be taken back by their manufacturers. Italy has required refrigerator takeback since 1997.
- Canberra, Australia (population 313,000) aims to be waste-free by 2010. It has made rapid progress, increasing its recycling rate by 92% by 2000-01 compared with 1995-96.

From: http://www.greenparty.org.uk/files/reports/2003/waste.htm

US Municipalities Taking Action

- **San Francisco, California**
  "FOOD TO FLOWERS!" SCHOOL PROGRAM ADDS COMPOSTABLE PLASTIC BAGS
  Sixty-five San Francisco schools participate in "Food to Flowers," diverting an estimated 500 tons of organic residuals each school year - including food scraps, napkins, milk cartons and now compostable bags (provided by Cereplast Inc.). becky.wike@sfgov.org.

- **St. Paul, Minnesota**
  WHY MINNESOTA RANKS SECOND IN THE NATION IN RECYCLING
  Minnesota is highly pleased with its BioCycle "State of Garbage" ranking as the second highest in the nation at 43.2 percent - behind only Oregon (45.2) percent - when it comes to recycling rates. Minnesota charges a Solid Waste Management Tax (SWMT) on garbage but not on recycling. That makes garbage more expensive and recycling more financially attractive. ... Beltsville, Maryland

- **Harrisburg, Pennsylvania**
  MUNICIPAL RECYCLING AND COMPOSTING GRANTS ADD UP TO 116 PROGRAMS AND $20 MILLION
  These grants also ensure that recycling continues to be a strong contributor to Pennsylvania's economy." They provide composting and recycling services for some 10 million residents. Yard waste and food residuals composting projects were well covered in the county-by-county listings.

- Five municipalities, **Milwaukee, Seattle, San Jose, Sacramento, and San Antonio**, have initiated waste prevention programs separate and distinct from recycling. **San Diego** is in the process of developing a program that focuses on composting and grasscycling. The City of **Denver** is creating a pollution prevention and waste minimization plan for government-owned facilities. **San Francisco** has implemented several waste prevention programs. Various cities have budgets for backyard composting bins.

BioCycle July 2006, Vol. 47, No. 7, p. 14

Users of Green Plastics

All of Us

Do we really need Fossil Plastics?

Only if they REALLY recycle.

A ZeroWaste Alliance:

http://container-recycling.org/zbcwaste/links.htm

Key Resources for this Presentation:

- http://www.algalita.org/video-order.html
- http://culturechange.org/e-letter-plastics_enemy.html
- http://www.earthresource.org/
- http://www.organicconsumers.org/articles/article_4414.cfm
- http://www.mindfully.org/Plastic/Biodegrade/Green-PlasticsAug00.htm
- http://www.container-recycling.org/
- http://www.sustainablepackaging.org/
- http://greenplastics.com/