

**The Fortnightly Club
Of
Redlands**

Founded 24 January 1895

Meeting Number 2003

4:00 p.m.

14 December 2024

Plastic: Miracle or Curse!

By: Ronald K. Running

Assembly Room, A.K. Smiley Public Library

Background of Author

Ron was born in Pasadena, California in the late 1940's and was raised in Temple City and Arcadia and has rightful claim to be a member of the *Baby Boomer Generation*. He attended California Polytechnic State University at San Luis Obispo studying architectural design. During his last year of undergraduate school he studied at the California State University International Program in Florence, Italy.

Upon graduation, Ron worked for the international architectural and planning firm of Victor Gruen Associates in Beverly Hills and Washington, D.C. on a variety of transportation, urban planning and redevelopment studies. While Living in Washinton, D.C. he attended George Washington University when he received a Masters of Urban & Regional Planning degree.

After finishing graduate school, Ron moved to Redlands and started his career in municipal planning first with City of San Bernardino. While thee he worked on several redevelopment projects, nortably the Tri-City Redevelopment Project which converted the Tri-City airport to the thriving commercial/industrial center that it is today.

He then went to work for the City of Corona as Principal Planner overseeing its rapid growth during the 1990's. There he particiapated in the development of several large community specific plans, and a downtown master plan. He then retired and became an independent planning consultant primarily with the City of Hemet.

Ron fell in love with the rich history of Redlands. Starting with its architecture, Ron moved and restored an 1888 Queen Anne Victorian home that once sat across from the A.K. Smiley Public Library on Fourth Street. He served for eight years on the City's Historic & Scenic Preservation Commission which saw the adoption of the original Historic Preservation Element of the General Plan and the Historic Preservation Ordinance for the City.

For many years, Ron has been an active member of the board of directors of the Redlands Area Historical Society, serving twice as president. He also is vice president of the Redlands Accelerate Neighborhood Climate Action group.

Since full retirement at the time of the pandemic, Ron keeps himself busy writing Fortnightly Papers, managing the website for the Historical Society and ANCA group, and traveling whenever he can.

Synopsis of the Paper

Plastic has become an indispensable component of our modern way of life. Largely developed since the post World War II years, it has transitioned from being a miracle product to being a curse not only polluting our environment, but also endangering our personal health and well being.

As a member of the Baby Boomer generation, Ron recalls when our lifestyle was not so dependent on plastic commodities. He surveys the current problem and potential solutions. The problems associated with plastic pollution are so immense that it will require global and individual cooperation to at least lessen the problem.

Introduction - Early Days – A Life Before Plastic

I am a proud member of the Baby Boomer generation. Born soon after World War II, we “Boomers” had parents that were members of the Greatest Generation whom lived and fought in the war, came home, got married, and began the amazing 1950’s!

The 50’s were full of potential. Culturally, the 50’s embraced modernism in it’s many forms. Television developed and grew to its vast potential. Mass production was embraced. New materials such as formica, chrome, and plastic came into vogue.

However, we “Boomers” typically had parents that grew up on the farm and had grand parents that still lived on the farm. This was the case with my family. My father came to California during the war from a small country farm in northern Minnesota. After spending the war years in Africa, Italy and France he returned to California to married my mother and to never have to see another snow flake again or milk another cow!

Both my parent’s generation and grand parent’s generation not only lived through the war they also survived through the Great Depression. Both periods taught or forced people to conserve and save precious commodities that were rationed during the war. So I grew up with kitchen drawers full of rubber band rolls, used aluminum foil sheets, and wax paper rolls.

Suburban life in Los Angeles seemed idealic. Milk was delivered to our door step in glass bottles. Bread and donuts delivered by the friendly Helms Bakery man. Dinner time was always exciting with the sound of the Good Humor Ice Cream truck sounding its arrival for a hopeful ice cream cone or popsicle after dinner.

My grandparents and cousins that still lived back on the farm lived a much more primitive existence. Visits back there were exotic seeing what live was like without indoor plumbing. My grandparents home still had a hand pump to get drinking water, which had to be heated on the wood stove.

The 50’s started out as a carefree time – especially when compared to the war years. People smoked freely. There was so much space around people didn’t think anything of tossing out miscellaneous trash and cigarette butts out the car window. Each home had its own incinerator. My favorite chore was to take out the trash at night to burn! I have fond memories of my dad loading up my little league team in the back of his pick-up truck to go to our game without a seat belt in sight!

The 1950’s was a wonderful period for a kid that was fascinated by technology and all new things.

Our lives back then were prior to the invention of microwave ovens, dish washers, centralized trash collection and other modern conveniences. So it is my generation that personally can remember how life was before the introduction of the miracle product - ***plastic***.

Plastic has become an ubiquitous a part of our lives today. We can't imagine life without it's use. But just like smoking, littering, and trash burning we now find ourselves plagued by plastic pollution on a global scale. But just like with cigarette smoking, littering and air pollution we can, we **must** come up solutions to insure a better future for subsequent generations.

Plastic Pollution Statistics – the Problem

Our miracle product is produced from petrochemicals. Plastic is strong, flexible, convenient, and cheap. However, we have found that plastic has a long life. Compared to natural products which biodegrade over time, plastic lives on and on! Fortnightly member, Ron Burgess outlined the history of plastic in his paper "Fantastic Plastic and Its Dark Side" presented October 19, 2017.

The most visible and obvious places of plastic pollution is in our landfills, water ways and beaches. In our earlier lives you went to the corner store to purchase a 25 cent or nickel bottle of pop which included a deposit which you got back when you brought back the bottle. The cost of recycling and reusing of the bottles was assumed by the producers. Today, even though we pay a CRV on each plastic bottle we purchase, the producers of the bottle bear no responsibility for the costs of recycling or reuse.

Fellow Fortnightly member, George Christison informed us in his 2023 paper on "Microplastics and Human Health" that recent research now is showing that there are unseen impacts of plastic pollution. We are ingesting **microplastic** (pieces smaller than five millimeters and **nanoplastic** (pieces smaller than one micron (a millionth of a meter) particles as we consume liquids stored in plastic bottles, as we cook in plastic containers, as we eat fish that consume microplastics found in the ocean. Research now shows that new born babies have traces of microplastics in their systems with which the mother's placenta was unable block. Microplastic-induced cellular and organ changes reported in cell tissue culture studies and in rodent experiments raise serious concerns that these particles could be contributing to alterations in our organ function, obesity, carcinogenesis and reduced fetal size.

There are three ways that microplastics enter our bodies, i.e. ingestion, inhalation, and through our skin. Examples of the later are through the use of facial scrubs with microbeads break down prior to any facial application. Particles smaller than 10 microns can cross cell membranes.

Another source of plastic pollution in with the use of synthetic textiles. Sixty two percent of all textile fibers produced in 2020 had petrochemically based synthetics. (Wilson 2022). These fibers break down into micrometer and nanometer range and have been found in the air, water and soil samples globally (Li 2023). "Fast Fashion" has become increasingly prominent in the textile industry. Cheaper clothing allows the consumer to purchase frequently, and dispose previous purchases. A 2019 UN report (UNEP 2019) found that the average consumer buys 60 percent more pieced of clothing than 15 years ago, keeping each items for only half as long. This causes producers and consumers to introduce enormous amounts of disposed-of clothing (and thus microfibers) into the global environment annually.

Our recent Covid-19 pandemic increased our consumption of plastic between 250-300%. Online shipping and take-out restaurant use are other factors in increased use of plastic.

In the 1950's 2 million metric tons of plastic was produced annually. It is estimated that by 2050 1.1 billion metric tons will be produced. In 2019, 1.1 billion metric tons of greenhouse gas were generated with plastic production. That represents 3.4% of the global total which is more than that produced by aviation or rice production world wide. It is estimated that by 2050, 2.5 billion metric tons of GHG will be created from plastic production.

Here are some examples throughout the world showing the magnitude of plastic pollution problem. For many years the United States shipped our used cardboard overseas to China and other countries to dispose or recycle. This became unfeasible when many of these countries enacted laws and policies that prohibits the import of our trash.

The United Nations Environmental Project estimates that 5 trillion plastic bags are used annually. That is estimated to increase 70% by 2040.

Over a trillion pieces of disposable foodware are used each year. 21% of the disposables are used in on-site dining with 79% for take-out or delivery. The plastics industry is estimated to contribute 19% of the global carbon emissions by 2040. In the early 2000's the amount of plastic waste generated in a decade was more than the previous 40 years! Presently there is over 400 million tons of plastic waste generated per year. It is forecasted that by 2050 that amount will be 1,100 million tons! 36% of all plastic used is in packaging and single use plastic. 85% of this plastic ends up in our landfills.

It is estimated that the ocean has 150 million metric tons of plastic waste. Over 11 million metric tons float into the ocean annually. I am sure you all have heard of the sea of plastic that is found in the middle of the Pacific Ocean that is as large as the state of Texas in area. This sea of plastic waste is formed by the oceans currents found at the Equator that allow the concentration of material.

Just like with smoking, littering or riding in the car without a seatbelt in the past, we are at a critical point where we have to incorporate life style changes to mitigate or lessen the impacts of plastic pollution. Can we do it?? The United States, by far, is the leader in the amount of plastic waste produced per capita.

As consumers we now have many of our disposal plastic products classified and labeled into seven different identification codes. Fortunately, we are told that five or six of the categories can be recycled. Category 6 (Polystyrene – PS) cannot be recycled. Polystyrene is made from crude oil and when improperly disposed persists in the environment for hundreds of years.

Plastic Resin Identification Codes

Quick Reference Guide

1	2	3	4	5	6	7
PETE Polyethylene Terephthalate	HDPE High-Density Polyethylene	PVC Polyvinyl Chloride	LDPE Low-Density Polyethylene	PP Polypropylene	PS Polystyrene	Other
Common Products: <ul style="list-style-type: none"> • water bottles • soda bottles • peanut butter jars 	Common Products: <ul style="list-style-type: none"> • milk jugs • 5 gal buckets • shampoo bottles • laundry detergent containers 	Common Products: <ul style="list-style-type: none"> • vinyl • tubing/pipe • siding • auto product bottles 	Common Products: <ul style="list-style-type: none"> • laundry baskets • bread bags • squeeze bottles • plastic film 	Common Products: <ul style="list-style-type: none"> • yogurt containers • amber-colored pill bottles • coffee cup lids • straws • kitty litter buckets 	Common Products: <ul style="list-style-type: none"> • styrofoam cups • solo cups • egg cartons • to-go containers 	Common Products: <ul style="list-style-type: none"> • toys • sippy cups • cd/dvds • lenses

@ConwaySanitation
 @CvyARSanitation



Examples of plastics that should be avoided are: plastic straws, PET bottles, plastic cups and lids, plastic utensils, balloons, Doy packs, Tetra Pak containers, plastic gloves, and polystyrene products. Also it is recommended that we replace disposable plastic items – especially tooth paste tubes.

Academic Research

The UCLA Luskin Center for Innovation has produced a comprehensive report in 2019 on the plastic pollution issue. There is substantial evidence of adverse environmental, economic, energy related and human health related impacts with plastic production and plastic waste. Only limited amounts of plastic are locally recycled. Foodservice ware is rarely recycled. Replacing single-use foodware is the most beneficial due to its volume. Numerous alternatives are now available. Customers are unlikely to go elsewhere if non-plastic ware is used.

Plastic Ordinances/Legislation/Codes

Our state and local governments are trying to enact legislation to curb the spread of plastic pollution with varying degrees of success.

State Legislation

The State of California has enacted several laws dealing with plastic pollution. **Senate Bill 54** was adopted in 2022. The Plastic Pollution Prevention & Packaging Producers Responsibility Act

AB 1290 – removal of toxins from PET & pigments

SB 1167 (Proposed)

- Sponsored by Sen. Blakespear (D-Encinitas)
- Effective 1-1-2025 if passed
- Requires reusable cups for dine-in

AB 2762 (Proposed)

- Required refillable beverage containers

AB 2236/SB 1053 (Proposed)

- Eliminates exemptions for plastic film
- Revises standards for reusable bags

Break Free From Plastic Pollution Act

Local Jurisdictions

There has been city and county ordinances dealing with single use plastic in over 125 jurisdictions. Pioneers in this effort have been the city of Berkeley and typically beach communities. Restrictions range from enacting a ban on single use plastics only at government facilities to complete ban on the use or sale of single use plastics. Many jurisdictions in Northern and Central California have enacted some form of single-use plastic bans. Some jurisdictions, such as Laguna Beach, outlaw the sale of any polystyrene products. 26% have a full ban on single-use plastics, only 11% restrict government facilities. The remaining 63% have restrictions for restaurants.

Table 1
Local Plastic Ordinances By County

County:	Restaurant	Full	Gov. Fac.	Total
Alameda	12	-	-	12
Contra Costa	8	2	1	11
El Dorado	-	1	-	1
Humbolt	-	1	-	1
Los Angeles	6	6	2	12
Marin	7	-	-	7
Mendocino	3	-	-	3
Monterey	7	1	-	8
Napa	1	-	-	1

Orange	5	-	5	10
San Diego	7	2	-	9
San Francisco	-	1	-	1
San Luis Obispo	-	4	-	4
San Mateo	17	-	-	17
Santa Barbara	-	2	-	2
Santa Clara	8	4	-	12
Santa Cruz	2	4	-	6
Sonoma	-	1	2	3
Ventura	1	-	1	2
Yolo	<u>1</u>	-	-	<u>1</u>
Totals	85(68%)	29(23%)	11(9%)	125(100%)

Santa Monica is an example of a coastal city that has found that expanded polystyrene and non-recyclable plastic makes up the largest amount of waste that ends up on its beaches. The city has been an early advocate to ban the use of non-recyclable plastic disposable food service containers for all city facilities and city sponsored and permitted events since 2007. In 2008 the city expanded its ban to all food service providers in 2008. Examples include cups, plates, trays, bowls, and hinged or lidded containers. It did not apply to single-use disposable food service items which are not used as food containers, such as straws, cup lids and utensils.

The Santa Monica ordinance allows for aluminum, recyclable plastics and containers of coated and uncoated paper. It recommends the coated and uncoated papers contain a minimum of 90% paper that is made from recycled content. Typically, these products are labeled as “post-consumer recycled content”. Other recommended products include compostable plant fiber products, such as Bagasse, which are now made from corn, sugar cane, bamboo, palm, grass and other rapidly compostable resources. Bio-plastics cannot be effectively composted in home composters or municipal composting operations, even though certain bio-plastic containers are labeled as compostable.

Larger jurisdictions such as the City of Los Angeles, Los Angeles County, San Diego City and County have enacted various levels of bans on single use plastic. Interestingly, these bans will be in effect in Los Angeles during the 2028 Olympic Games. Fortunately, there is a whole new industry developing that is offering creative solutions to minimize single use containers at large scale events. Examples include deposits for encouraging the return and reuse of glass containers. Most jurisdictions allow for single use cutlery upon request by customers. Most recently these jurisdictions have brought a lawsuit against the Coca Cola and PepsiCo companies for falsely claiming their recycling statistics for their plastic containers. Coca Cola has promised that 50% of their bottles will be made from recycled plastics by 2030.

The City of Irvine recently has tried to introduce comprehensive legislation banning single-use plastic. The proposed ordinance would restrict not only the use of single-use plastic at restaurants but also metallic balloons. A waiver would be allowed if there is not product equivalent. At their city council hearing the grocery store bag industry as well as balloon advocates came out against the proposed ordinance. The Irvine experience might be an example of the pitfalls of asking the community to do too much all at one time.

Inland Empire Jurisdictions

Rancho Cucamonga is currently the only jurisdiction in San Bernardino and Riverside counties that restricts single-use plastic items – but only a city government facilities and events!

The Redlands ANCA group in conjunction with the University of Redlands student interns has surveyed local fast food establishments to find that local restaurants might be willing to restrict the use of single use plastics if everyone else is required to do so. The costs of doing so is in most cases more than single-use plastic.

The City of Redlands Municipal Services currently provides most of us the ability to recycling our plastic, aluminum, glass and card board waste in our blue containers. Plastics No. 1-3, 5 and 7 can be recycled. Not included is Category 4 (Low-Density Polyethylene – LDPE) which are laundry baskets, bread bags, squeeze bottles and plastic film. As previously mentioned, Category 6 (Polystyrene – PS) also can not be recycled. Common Category 6 products include Styrofoam cups, egg cartons, to-go containers.

Anti-Plastic Pollution Advocacy Groups

Locally, here in Southern California there are several groups that have been advocating for legislation against single-use plastic:

- Heal The Bay
- 5 Gyres Institute
- Californians Against Waste
- The Story of Stuff Project
- Surfrider Foundation

Nationally there are many organizations that are lobbying and providing public information. Examples of these groups are:

- Beyond Plastics (www.beyondplastics.org)
- Biodegradable Products Institute (www.bpiworld.org)
- Break Free From Plastic (www.breakfreefromplastic.org)
- Business Coalition for a Global Plastics Treaty (www.businessforplasticstreaty.org)
- Californians Against Waster (www.cawrecycles.org)
- Champions of Change (business coalition)
- Earth911 (www.Earth911.com)
- Oceanic Global
- Pacific Environment (www.pacificenvironment.org)

- Plastic Free Restaurants
- Plastic Pollution Coalition (www.plasticpollutioncoalition.org)
- Upstream Solutions (www.upstreamsolutions.org)

The 5 R's of Zero Waste

The above mentioned groups and others advocate for adopting the 5 R's of Zero Waste to lessen our dependence on so much plastic. Other groups advocate for supporting the development of a more circular economy that recycles and reuses products.

Plastic Recycling

The United Nations estimate that only 9% of plastic is recycled. In Redlands our recycling company, Burtec claims that all of Redlands recycled waste is recycled. A recent article in Bloomberg Green highlights TerraCycle Inc. company which contracts with major manufacturers to recycle their plastic products. Contracted companies then can display the TerraCycle logo and claim that their product is being recycled. Closer investigation found that TerraCycle collects plastics and other materials, but then ships the materials to other companies that do the sorting. Sorting and story of recycled material is costly. While small plastic pens could be recycled the costs of collection and recycling such a small item is infeasible. I have recently heard that items less than 3 inches in size are unfeasible to recycle.

Recycled plastic products that are considered contaminated are used in building materials such as building blocks, or playground equipment. TerraCycle claims that 75% of U.S. schools have some sort of waste recycling programs.

Plastic Alternatives

Fortunately, there has been progress made in the development of alternative material products, such as plant based plastics, that are biodegradable. Suggested alternative include reusable straws, water bottles, travel utensils, and reusable bags.

The following polymers are bio-based and biodegradable (Source: Beyond Plastics, p. 12):

- Polylactic acid (PLA)
- Polyhydroxyalkanoate (PHA)
- Polybutylene succinate (PBS)
- Polyhydroxybutyrate (PHB)
- Polybutylene adipate terephthalate (PBAT)
- Cellulose- and lignin-based fibers
- Seaweed polysaccharides
- Mycelium
- Chitin/protein-based polymers

Alternatives to plastic are derived from the following materials:

- Starches from corn, cassava, sugarcane, beets, etc.
- Agricultural and forestry byproducts, food waste, algae, yeasts, and bacteria
- Agricultural and forestry products and wastes
- Bamboo
- Kelp
- Fungi
- Carb shells

They have the following uses:

- PHA/PHB: packing and tableware
- PHB/PLA: agricultural mulch films
- PHB: surgical sutures and drug delivery systems
- PLA: foodware and shopping bags
- PBAT: shopping bags, disposable medical supplies, films and 3D printing

Interestingly the following polymers are biobased but are non-biodegradable:

- Bio-polyethylene (bio-PE)
- Bio-polyethylene terephthalate (bio-PET)
- Bio-polyvinyl- chloride (bio-PVC)
- Bio-polyurethane (bio-PU)
- Polyamides, or nylons Polytrimethylene (polyesters)
- Polyterephthalate (PTT)

The biobased, non-biodegradable products are derived from:

- Sugarcane ethanol
- Corn
- Vegetable oils from various plant sees, such as castor, cotton, rapeseed, jatropha, palm and soybean

The uses of the biobased, non-biodegradable products are:

- Bio-PET: soda bottles
- Bio-PA: automotive industry
- Bio-PVC: construction industry
- Bio-PE: Food packaging, consumer goods
- Bio-PTT: fabrics, automotive and carpets

There are some **fossil-fuel** based, biodegradable polymers including:

- Polybutylene succinate (PBS)
- Poly-e-caprolactone (PCL)
- Polybutylene adipate-co-terephthalate (PBAT)

- Poly-butylene succinate-co-butylene adipate (PBSA)

These are the products that the fossil-fuel based, biodegradable polymers:

- Petrochemicals

The uses of the fossil-fuel based, biodegradable polymers are:

- Mulch films in agriculture
- Garbage bags
- Single-use cutlery

The Upstream Solution organization report “Reuse Wins” makes the following findings:

- Reuse food service ware beats single use alternatives by every environmental measure (Finding #1)
- Going to reusable saves money (Finding #2)
- Progress has been made in the re-use service economy, i.e. home delivery systems and re-fill options (Finding #3)

A 16 oz. polypropylene (PET) cup costs approximately 4.5 cents where a compostable PLA cup costs 19 cents. Unfortunately, there is a lack of mandatory standards for biodegradable products. There are no federal standards for bioplastics.

Our local Redlands Accelerate Neighborhood Climate Action (ANCA) is working with student interns at the University of Redlands to survey local Redlands restaurants as to their plastic use. Predominately, they have found that most are using conventional plastic products. However they have indicated that they would be willing to switch if it is a requirement for everyone.

Redlands is fortunate they have a local store – The Feel Good Store at W. State Street that offers many substitute sustainable products. They offer refillable soaps and cleansers as well as many attractive personal cutlery kits. They also have examples of products to use instead of plastic wrap. Examples include bee’s wax wrap and biodegradable plastic bags.

Conclusion: The Dream – What Can Be Done

We find ourselves in a world of hurt with world wide plastic pollution. Unfortunately, there isn’t a simple one size fits everyone solution. Fortunately, there are many, many solutions to this ever-growing problem. The necessary solutions or mitigations will come from governments, companies, individuals and communities.

- **Government**

Any international treaties regarding plastics should contain the following provisions:

- Banning unnecessary single use plastic products such as plastic bags, utensils, stirrers, polystyrene, shipping envelopes, etc.
- Investing in reuse and refill infrastructure that reduces our reliance on single-use products.
- Requiring that plastic be replaced by 50% in the next decade and that which is left can be actually be safely recycled, which means eliminating toxins in plastic.
- Making plastic polluters pay for the damage they cause.
- Banning waste exports so that nations are required to manage their own waste and stop dumping it in other countries.

We should encourage and support all efforts (state and local) to help minimize plastic use. A local ordinance banning or restricting single use plastic could contain the following:

- Expanded Polystyrene (EPS) products use
- Expanded Polystyrene (EPS) product sale
- Single Use Plastic Foodware at restaurants
- Single Use Plastic Straws at restaurants, schools, etc.
- Single Use Plastic Straws (Upon Request Only)
- Use of Single Use Products on Government Properties
- Plastic Water Bottle (less than 34 oz.)
- Plastic Produce Bags
- Plastic Shopping Bags
- Plastic or Metallic Balloons

- **Recommendations for Redlands**

- Implement a Comprehensive Ban on Single-Use Plastics
 - Scope of the Ban: the ban should include plastic bags, cutlery, straws, stirrers, food containers, and other disposable plastics commonly used in retail, restaurants, and city events.
 - Target Phases: Implement the ban in phases, starting with larger retailers and eventually including smaller businesses, to allow adequate time for adaptation.
 - Exemptions: Provide exemptions for essential items where suitable alternatives are not yet available, such as medical equipment or items for individuals with disabilities.
- Promote Reusable and Compostable Alternatives
 - Incentives for Businesses: Offer tax incentives or grants to businesses that switch to sustainable alternatives like compostable containers, reusable bags, and biodegradable packaging.
 - Educational Campaigns: Educate the community on the importance of reducing plastic use and promote the availability and benefits of sustainable alternatives.
- Establish Partnerships with Local Businesses

- Encourage partnerships with local businesses to create a “Plastic-Free Redlands” initiative that recognizes companies prioritizing sustainable practices.
 - Work with retailers and restaurants to distribute reusable bags and containers to customers as a practical alternative to single-use plastics.
- Strengthen Waste Management Infrastructure
 - Invest in waste management infrastructure to support the composting of biodegradable alternatives and to facilitate effective recycling programs.
 - Expand public recycling and composting facilities across Redlands to encourage responsible waste disposal by residents and visitors.
- Establish Regular Monitoring and Reporting
 - Set measurable goals for waste reduction and conduct periodic assessments to monitor the effectiveness of the ban.
 - Publish annual reports detailing progress, challenges, and areas for improvement to maintain transparency and accountability.

- **Business Community**

Typically, the business community will follow consumer demands. However, that requires that the consumer is educated and has reasonable alternatives for choice. Fortunately we see many companies with enlightened management that is taking the lead in providing environmentally superior products. Generally, I have seen that a large segment of the younger generation has incorporated a more environmentally sensitive life style. This is evidenced in my own family where the youngest generation has selected vegetation or plant-based diets and a preference of shopping at thrift stores over chain store retail outlets.

The medical industry is replete in the use of plastic products. Minimizing the use of plastics in a medical setting is complicated. It is an important topic that is important enough for an entire paper and research. Hopefully the advances in biobased biodegradable product development might solve some of the amount of non-recyclable plastic use in the medical industry.

Recommendations for companies (restaurants) to consider are as follows:

- Perform a plastic audit
- Involve your staff
- Involve your customers
- Make the switch
- Start the use of reusables for take-out
- Only use disposables as a last resort
- Offer incentives (discounts) for Bring Your Own (BYO) customers
- Sell reusable foodware

- **Individuals/families**

As individuals and families can have a huge role in minimizing consumption of plastic products. It is critically that we all become educated on the hazards of plastic use, and what are the practical alternatives. Generally, we can all adopt a more sustainable style of living. The 6-R's of Sustainable Living include: 1.) Reduce, 2.) Reuse, 3.) Recycle, 4.) Refuse, 5.) Repair and 6.) Rot.

We should all consider reducing our amount of consumption. We should consider reuse of our household items rather than continuing to purchase new. Where possible we should try to recycle what we have already purchased. We should refuse whenever possible and practicable. We should consider repairing an appliance or piece of clothing rather than purchasing new. Finally, we should consider composting as an effort to further minimizing our green waste – but that is another topic!

Personal Initiatives

Here are some suggestions to help minimize the impacts of plastic pollution:

- Pick up discarded plastic at the beach or a river
- Shop sustainably
- Try a zero-waste life style
- Travel sustainably – take your own reusable water bottle and cutlery, use reef-safe sunscreen
- Be an advocate for change
- Dress Sustainably – avoid polyester, go to vintage clothing stores, repair your clothes
- Choose plastic free personal care and cleaning products

A Personal Plastic Reduction Plan:

- Don't buy beverages in cans or single serving bottles.
- Never buy bottled water
- Use glass, aluminum or steel reusable water bottles
- Take a reusable travel mug to the coffee shop
- Take your own reusable containers for takeout at restaurants
- Patronize businesses that provide non-plastic alternatives
- Take your lunch to school or work
- Buy milk in returnable, reusable glass bottles
- Buy food and condiments in recyclable glass jars whenever possible
- Buy solid/powder detergent verses liquid in plastic bottles
- Bring your own reusable bags
- Shop for food in bulk bins
- Use lightweight cotton or nylon reusable bags for both your produce & bulk items
- Don't use processed, packaged goods
- Avoid using single use plastic as much as possible (i.e. placemats, straws, cups and single serving containers)
- Avoid cooking in plastic containers
- Use glass containers as often as possible
- Don't use throwaway plastic razors & blade cartridges

- Make your own non-toxic toothpaste, deodorants, shampoo & makeup
- Use cloth diapers
- Use other people's plastic bags for pet waste cleanup
- Avoid buying anything disposable
- Avoid buying anything in packaging when there is an unpackaged alternative
- Give your old clothes to charities or other persons
- List items you no longer need on *Freecycle* or *BuyNothing*
- Skip buying plastic garbage bags
- Skip buying plastic grocery bags
- Support local and state legislation for minimizing plastic use

Our fellow Fortnighter Dick Corneille in his recent paper on the "Circular Economy" prefaced his paper by stating that he feels a responsibility as a "Baby Boomer" in trying to personally adopt and encourage change for a sustainable future. It is my hope that all fellow "Baby Boomers" can be inspired to return to a lifestyle reminiscent of our childhood, that incorporates some of our earlier practices which encouraged a more environmentally friendly lifestyle in the future, and that by doing so we can inspire change world-wide. Just like we have done with smoking and littering in the past, we have learned that there are limits and consequences to our consumption. My hope is that we can do the same to minimize our addiction to plastic.

Plastics Research Sources

Articles/Papers:

- “Amazon Packages Burn in India: Final Stop in Broken Recycling System” (Bloomberg Green)
- “Anthropogenic Contamination of Tap Water, Beer, and Sea Salt” by M. Kosuth, S. A. Mason & E.V. Wattenberg (2018) *PLOS ONE*, 13(4), e0194970.
- “Are There Alternatives to Plastic?” – Emma Holn-Olsen, Earthday.org (December, 2024)
- “A Wolf’s in Sheep’s Clothing: The Plastics Industry’s ‘Public Interest’ Role in Legislation and Litigation of Plastic Bag Laws in California” by Jennie R. Rober & Shanna Foley, (2012) Golden Gate University, *Environmental Law Journal*, v5, Issue 2, Article 8. (5 Golden Gate V. Env’tl. L.J. 377.
- “Banning Plastic Straw by Straw: Why California Needs a More Harmonized Approach to Plastics Management” by Rachel Adell, University of Lund, Masters of Science in Environmental Management and Policy Thesis (May 2020).
- “Behavior Changes Following a Plastic Bag Ban in South Korea” (2020) by J. Park. & S. Ha in *Sustainability*, 12(3), 1043.
- “Big Plastic’s Faltering Global Clean-up Effort (Bloomberg Green)
- “Decarbonizing Your Life” (Bloomberg Green – Fall/Winter 2022)
- “Fantastic Plastic and Its Dark Side” by Ronald L. Burgess, *Redlands Fortnightly Paper* presented October 19, 2017.
- “Demystifying Compostable and Biodegradable Plastics” by Beyond Plastics (July 2024)
- “Hold the Plastics, Please: A Restaurant’s Guide to Reducing Plastic” by Beyond Plastics (July 2022)
- “Implementing Plastics Recycling Mandates by Gail L. Achterman, (1994) *American Bar Association Natural Resources & Environment*, Vol. 9, No. 2 (Fall 1994, pp. 13-15).
- UCLA Luskin Center for Innovation Feasibility Report (2019)
- “Ocean Friendly Foodware Guide” – Surfrider Foundation
- “Plastic Ingestion and Human Health” by R. DeMatteo, et. al. (2020) *Environmental Health Perspectives*, 128(4), 040501.
- “Predicted growth in plastic waste exceeds efforts to mitigate plastic pollution” by S.B. Borrelle, et. al. (2020) *Science*, 369(6510), 1515-1518.
- “Production, Use, and Fate of All Plastics Ever Made” by R. Geyer, J.R. Jambeck, & K.L. Law (2017) *Science Advances*, 3(7), e1700782.
- “Public Attitudes Toward Plastic Waste: A Survey of Californian Residents” by D. Dillman, et. al. (2020) *Environmental Policy*, 45(2), 214-222.
- “Reusable Food Serveware Guide” (ReThink Disposables)
- “Reusable Food Service Product Guide” (Plastic Free Restaurants)
- “Reuse Wins” Report (Upstream)
- San Jose City’s “Single-use Carryout Bag Ban: Implementation and Impact Report” (2012)
- “TerraCycle’s Recycling Dream” by Leslie Kaufman (Bloomberg Green)
<https://www.bloomberg.com/features/2022-terracycle-tom->

[szaky/?cmpid=BBD120224_GREENDAILY&utm_medium=email&utm_source=newsletter&utm_term=241202&utm_campaign=greendaily](https://www.bloomberg.com/graphics/2022-plastic-climate-change-pollution-data/?cmpid=BBD120224_GREENDAILY&utm_medium=email&utm_source=newsletter&utm_term=241202&utm_campaign=greendaily)

- “Single-Use Plastics: A Roadmap for Sustainability” UNEP (2018).
- “Thailand is Tired of Recycling Your Waste” (Bloomberg Green)
- “The Climate Impact of Our Insatiable Plastic Addition” by Leslie Kaufman (Bloomberg Green)
https://www.bloomberg.com/graphics/2022-plastic-climate-change-pollution-data/?cmpid=BBD120224_GREENDAILY&utm_medium=email&utm_source=newsletter&utm_term=241202&utm_campaign=greendaily
- “The Ecological Impacts of Marine Debris” by C. M. Rochman, et. al. (2016) *Annual Review of Marine Science*, 8, 299-324.
- “West Africa is Drowning in Plastic” (Bloomberg Green)
- “What Are Microplastics Doing in Our Bodies” by George W. Christison, MD (2023)

Books:

- “Beyond Plastics: Demystifying Compostable and Biodegradable Plastics”
- “Plastic: A Toxic Love Story” – Susan Freinkel

Companies:

- Abeego Beeswax Reusable (foodwrap)
- Blueland.com (cleaning products)
- Burtec (Solid Waste Recycling)
- B’zeos.com (seaweed biodegradable material)
- Deliver Zero (NYC)
- Dispatch Goods (SF)
- Earthbreeze.com (cleaning products)
- 8billion trees.com (planting trees)
- Eco-Products Inc.
- EcoSoul.com (trash bags)
- Encora (Seattle)
- Etchicalearthstore.com (organic bamboo toothbrushes)
- Friendsheepwool.com (dryer balls)
- Fordays.com (textile recycling)
- GDB International (plastic recycling, New Brunswick, NJ)
- Genecis.com (products made from PHA)(Toronto)
- Grabgreehome.com (eco-friendly laundry pods)
- Grefusion (compostable bags)
- Kindlaundry.com (laundry sheets)
- Legacyfoodstorage.com
- Livecoc.com (recyclable brush heads)
- Livingoutlines.com (return recycling)
- M’Porte (San Diego)

- Nature Works LLC
- Notpla Limited(seaweed cutlery)(2022 Earthshot winner)
- PackageFreeShope.com
- Plantswitch.com (turns plant material into plastic alternatives)(Sanford, NC)
- Recoverfiber.com
- Re:Dish (NYC)
- Reelpaper.com (bamboo toilet paper)
- Refork (wood fiber cutlery)
- Reli Compostable bags
- Reusable Takeout Venders:
 - reVessel
 - Eco Lunchbox
 - Eco Takeout
 - Kleen Kanteen
 - Steely's
 - M'Porte
 - Indian Tiffi
- Reusable Beverage Companies:
 - CupZero (Brooklyn, NY)
 - Foreverware (Minneapolis)
 - Vessel Works (Boulder, CO)
 - Okapi Reusable (Portland, OR)
 - Recovery Basins (SW CO)
 - rWare (Denver, Seattle)
 - Usefull Recircalbe (Boston)
- TerraCycles.com
- TruEarth (cleaning products)
- Trybite.com (toothpaste)

Government:

1. <https://www.gov.ca.gov/2024/03/08/californias-landmark-plastic-pollution-law-moves-forward/#:~:text=This%20landmark%20law%20requires%20that,plastic%20packaging%20and%20food%20ware.>
2. <https://calrecycle.ca.gov/Laws/Rulemaking/SB54Regulations/>
3. <https://calrecycle.ca.gov/2024/03/08/press-release-24-03/>
4. <https://www.dlapiper.com/en/insights/publications/2024/04/californias-next-step-in-implementing-landmark-plastic-pollution-law>

Handles:

- #PlanetOrPlastic
- #WildlifeOverWaste
- #EmbraceReuse

- #RefuseSingleUse
- #BreakFreeFromPlastic
- #ZeroWaste
- #PlasticFreeRestuarants
- #ReuseRevolution
- #SkiptheStuff
- #SkiptheStraw
- #HoldthePlastic
- #PlasticFree
- @PlasticsBeyond (Twitter)
- @BeyondPlasticAction (Facebook)
- @BeyonPlasticsBennington (Instagram)

Jurisdictions:

- Davis (<https://www.cityofdavis.org/home/showpublisheddocument/7979/636325227886070000>)
- El Cerrito (<https://www.el-cerrito.org/803/Foodware-Ordinance-Summary>)
- Los Angeles County (<https://file/lacounty.gov/SDSInter/bos/supdocs/167640.pdf>)
- Mountain View (<https://mv-voice.com/news/2021/11/16/mountain-view-bans-plastic-food-ware-for-all-restaurants-starting=in=2023>)

Movies:

- “Plastic Wars” – PBS Frontline
- “The Story of Plastic” – PBS (2020)

Organizations:

- Beyond Plastics.org
- Biodegradable Products Institute (www.bpiworld.org)
- Californians Against Waste (www.cawrecycles.org)
- Earth911 (www.Earth911.com)
- European Bioplastic Association
- Oceanic Global
- Plastic Free Restaurants
- Rethinkdisposables.org
- Surfrider
- Upstream Solutions (www.upstreamsolutions.org)

Programs:

- Washington DC Ditch Disposables Award Program

Research Organizations:

- Bloomberg NEF – clean energy research

Sources:

- Foodware Calculator by ReThink Disposables
- Single Use to Reuse Savings Calculator – Upstream
- The Blue Standard Plastic Checklist – Oceanic Global

Tools:

- Bioplastics Toolkit (Surfrider)
- Foodware Calculator (ReThink Disposables)
- Greenwashing Guide (Oceanic Global)

Websites:

- www.storyofplastic.org
- www.pasticfreerestaurants.org
- www.refed.com
- www.epa.gov/sustainable-management-food/sustainable-management-food-basics
- www.usda.gov/foodlossandwaste/why
- <https://carecycle.ca.gov/Laws/Rulemaking/SB54Regulations/>
- <https://calrecycle.ca.gov/2024/03/08/press-release-24-03/>
- <https://www.dlapiper.com/en/insights/publications/2024/04/californias-nest-step-in-implementing-landmark-plastic-pollution-law>