

The negative impact soap has created is due to the discovery of it being useful enough to be sold. Before soap was a commodity to barter for, people used fat and mud that gathered at the site of animal sacrifices. After finding it affective in cleaning materials, humans began to market soap, adding berries for perfume and color (Baugher, 1999, pg 225). Later, scientist found that chemicals could create soap cheaper and so detergent was born.

The first instance of natural soap was derived in the Roman Era at the bottom of Sapo Mountain, many believed its name was derived from this mountain, where animal sacrifices left fats to fall down into the mud embankment, which allowed easy access to those cleaning their clothes at a river nearby (Baugher, 1999, pg 225). Before chemicals, national standards, and the Food and Drug Administration, people weren't worried about the negative side effects of soap. Now, with chemicals, testing, and growing knowledge soap innovators have created soaps that are claimed to be "biodegradable" when in actuality producers are making soaps specifically for uninformed consumers.

Biodegradable soap labels often mislead buyers into believing it isn't harmful to the environment when in actuality it can produce serious direct and indirect problems in ecosystems. If something is biodegradable it means that it is capable of being decomposed by biological causes, particularly bacteria. If the material is "left alone" it should be able to decompose on its own. The effects campers impose on water sources through the use of biodegradable or non-biodegradable soap has been overlooked because the word "biodegradable" leads consumers to think it isn't harmful. Indirectly the bio soap causes impact on ecosystems that often goes unheard of by consumers. Some bottles warn campers to bathe and wash hands two hundred feet away from a water source, but the fine print is usually looked over and the label illustrates trees

and mountains on the front of the bottle, which also misleads the consumers into believing they aren't harming the environment. In actuality the product has no promise in being biodegradable and so producers of the product can use any marketing strategies to make the product desirable.

### *The Issues*

Biodegradable soap effects the environment it is put in. Any foreign substance implemented into an ecosystem may impact it. However, companies make consumers believe otherwise. One of the biggest issues is the fib the producer can make. Ingredients listed on a product are only the ones in the substance that are at a high enough quantity to be considered toxic. In other words, toxic materials are only considered toxic if in a large enough quantity (above 1 percent) (Coons, 2008, pg 28). Sadly, even the organic brands are misleading:

Detergents in fake soap products are usually made in part or even entirely from petroleum along with vegetable feedstocks. For instance, Sodium Myreth Sulfate, the main ingredient in JASON's so-called "Pure, Natural, & Organic Soap" is made by attaching ethylene oxide groups from petroleum to vegetable fatty acid, which also produces trace 1,4 dioxane as a side reaction. Olefin Sulfonate, the main ingredient in both Nature's Gate ORGANICS "Soap" and Kiss My Face ObsessivelyOrganic "Soap", is made entirely from petroleum. Cocamidopropyl Sultaine, the main ingredient in EO's so-called soap, is in significant part petroleum-based. (Coons, 2008, pg 28)

In reading the ingredients of biodegradable soap and detergents people discover that they are made with harmful substances such as phosphorous. Phosphorous is never found as a free element in nature due to its high reactivity. It is an element that can lead to increased plant or algae growth, oxygen depletion, and it also tends to age a water source quicker (Coons, 2008, pg 28). Something people don't want to be lingering in the water that they can ultimately be drinking. It is also a main ingredient in fertilizer. Instances of such algae growth has even brought states like New Hampshire to ban the making of soaps with phosphorous in it. In the 1980's New Hampshire had a phosphorous scare when Kezar Lake was showing large amounts

of algae growth and death of amphibian and fish life. The large amounts of phosphorous found in the lake was mostly due to a large water treatment plant that was dumping gray water into the lake. After being shut down, researchers found that it was responsible for 71 percent of the external phosphorous load. Phosphorous inactivation, wetland manipulation, a large budget, and time brought Kezar Lake back to natural and healthy terms (Conor, 1989, pg 845).

### *The Ecology*

While hiking around South Manitou Island, Peggy Najarian, an environmental science professor, noticed a large amount of algae growth and soapy shores in Lake Michigan. She then began to question whether the suds that filled embankments were due to water treatment plants or to the large amount of campers using Campsuds. She assumed that the large amount of algae growth was due to an increase in phosphorous levels (2007, pg 3). She defines phosphorous as a limiting factor in lakes:

If this factor becomes abundant, excess growth of an organism, or group of organisms, that require that factor will occur. If the organism is an alga, we call this excess growth an algal boom. Algal booms are often caused by a phenomenon called cultural eutrophication. This is described as the overnourishment (or increase in a limiting factor or nutrient) of aquatic ecosystems with plant nutrients because of human activities (Miller, 2000 pg 23).

Campers head to the woods and wash up with their palm or lemon oil bio soap. The label leaves their conscience light because the consistency of palm or lemon oil sounds natural and while it may be, it can be a foreign substance to the woods it ends up in. There are no lemon or palm trees along the Michigan Lake, saturating it to be a typical agent in the water. Regardless, indirectly the production of bio soap is causing detrimental effects on the environment because of the foraging of palm oil:

Oleochemical-based detergent raw materials are under environmental pressure because destruction of rain forests to clear space for oil palm plantations,

primarily to satisfy biofuel demand, is causing huge carbon dioxide emissions and threatening wildlife habitats. Palm oil is the main precursor for palm stearin. (Farquharson, 2008, pg AL8)

This is another example of a consumer being unaware of a verity that isn't brought to their attention. It is also an example of taking advantage of the less wealthy countries. Malaysia is responsible for most of palm oil extraction. Aware that the United States will buy their palm oil in large quantities, they adapt their orchards to accommodate, resulting in deforestation (Farquharson, 2008, pg AL8)).

Soaps are foreign substances to the environment they become a part of. The substances are thought to be insignificant because they are used in such small dosages. However, that is the mindset that more than just one camper may have. Ultimately it ends up that many campers have this mindset of disregarding a drop of soap; but often times that's all it can take to impact an environment and its wildlife. "All detergents will destroy mucus membranes and gills to some degree. The gills may lose natural oils, interrupting oxygen transfer" (Cooke & Kennedy, 1981, pp 68). Damaged mucus membranes allow fish to be susceptible to bacteria and parasites. Detergents, any in general, are toxic to fish near 15 parts per million and can kill fish eggs at 5 (ppm). Indirectly, even at 2ppm water tension is lowered enough for fish to absorb twice the amount of organic chemicals like pesticides (Cooke & Kennedy, 1981, pp 68).. Many may wonder why the loss of some fish is detrimental. Fish aren't just for human recreation; the loss of fish would break down a link in the food chain. Fish are not only eaten by other wildlife, but are also responsible for the prevention in a boom of algae. The turbidity of rivers remains healthy because of fish that prevent pools in rivers from keeping a constant muddy demeanor. When salmon travel upstream to spawn they rely on mucus membranes to keep their skin slick when hitting rocks. A lot of bacteria in streams collect on rocks. Salmon often end up rubbing on rocks

while jumping upstream and if their mucus membranes are damaged then the bacteria that is collected is absorbed easier by the fish and can ultimately kill them (Cooke & Kennedy, 1981, pp 68)..

Soap makes water soluble for greases and oils to emulsify in. This is why soap works on dishes. For instance, water will not mix with oil because oil is a non polar molecule while water is a polar molecule. In order for the two to interact, it needs soap, and this process is called emulsification. Emulsification allows people to get oil off their clothes or grease off their pans (Baugher, 1999, pp 225).

Soap is made out of a long chain of atoms. Each end of the chain is highly different from one another. One end of the chain is highly polar allowing it to interact with water well because like dissolves like while the other end of the chain consists of a non polar group of atoms allowing it to interact with grease and oils. So in a way, soap acts like a bridge to connect the gap between water and greases. Once the soap connects to the grease it is easily wiped away. However, it is really running water that gets rid of the grease because soap alone cannot loosen the dirt off skin. Lye in soap makes a hostile environment for the germs and bacteria to live in but it doesn't kill them (Baugher, 1999, pp 225). This is also why it is harmful to fish. One end connects to the water while the other end connects to the essential oils that keep a fish healthy and immune to bacteria in the waterways. This sheds light on the fact that campers that are cleaning their hands in rivers aren't even getting the best result out of the bigger problems it may cause. Soaps are the most effective in warm waters and while running water is a key ingredient in getting something clean, it also needs to be clean water. Not that the water is necessarily toxic, but runoff from other human-caused pollutants such as pesticides could ultimately end up in what campers wash their muddy hands in (Baugher, 1999, pp 225).

### *Humans*

Humans often believe that they can fix a problem that already exists with a different solution. In this case, dilution of soaps is not a solution. The consistent use of biodegradable soap in a stream by someone washing their hands or a boat, causes a concentration of the substance and can ultimately cause the water system to be unable to breakdown the substances that the soap consists of. Biodegradable soap was not made to be used in water sources. It relies on bacteria in soil to break it down. Companies should be commended in being more environmentally friendly with palm and lemon oil based detergents because it is better than phosphorous or other chemicals ending up in the water ways, but it doesn't fix the problem:

there are two categories of green products: Best in class, which refers to the best of a bad set of products (for example, biodegradable plastic bags, which are better than regular plastic bags but still belong to a category that's inherently unsustainable); and alternatives to unsustainable products, such as a cleaning solution that uses vinegar instead of ammonia as a base. (Farquharson, 2008, pg AL8)

Creating a stance on what is biodegradable for everyone to agree on can be next to impossible without the producer's and government cooperation. People have to buy into the importance of the effects biodegradable soap is having on the environment. Sadly money and convenience play a large part in swaying people's concern. In an essay, *Why Don't Consumers Behave Ethically?*, researchers interviewed twenty consumers from ten countries, to find their stance on their own consumptions. Presented with the scenario of choosing degradable soap the American participant said, "...it's not a big deal, it's hard to tell from packaging; not a big deal—cost is more important. It just doesn't matter to me." Another said, "I've never really noticed, it would take some kind of catastrophe to make me notice." Another American said, "Fish would have to start dying for it to affect me—I have to be hit over the head" (Porter, 1999, pg 183). However, fish

have and will die due to bio soaps and detergents of all kinds. Unfortunantley, consumers often have a higher agenda. People can see a designer purse or sneakers, but they don't see one another's soap. It can be hard to blame a corporation for being uninformative and lying if the consumers don't care in the first place, if all consumers see is a price tag. However the citizens in the United States are not poor, but rather greedy. Over ninety percent of each household has a television. A new cell phone or designer purses come out every month and these consumers being interviewed just worry about detergents being cheaper and that's the only thought that matters until they see a direct effect. Preservation can't occur without the support of people that see beyond the effects of day to day impacts. "Most of the change to [sustainability and greener products] has been voluntary, and it's driven by the marketplace," says Ernie Rosenberg, president and CEO of The Soap and Detergent Association (SDA). "Companies want to be able to represent their products as being greener than the next guy" (Phillips, 2008, pg 23). This is an issue that is gradual. People aren't seeing fish dying or rainforests being chopped down. It isn't immediately affecting them now- but it could and will if not for this generation, then it could impact the next one. Preservation is effective because it prevents the impacts from occurring, but people are waiting for something huge to occur. A something that will hit them over the head and it will be too late to fix the damage. It may not cost consumers literally now, but if the impacts are detrimental, like Kezar Lake, it will take a sufficient amount of time, money, and work to fix the damages done. The consumer may end up paying up anyway. The money needed in fixing the bigger problem could end up being taxed by the government. Being *more* environmentally friendly is better than not caring at all of course, but a new problem will arise with a quick fix. Creating sustainable products would be the most efficient in protecting the environment.

Biodegradable soap can be a better solution for those in the kitchen, but in the backcountry soap is often unnecessary for the situations it's used for.

### *The Solution*

The ban of such substances as phosphorous and other harmful elements should be enforced nationwide. Reading the label and being informed of what is harmful to the environment is the first step of overseeing the money hoarding companies that don't care to take responsibility in the effects their product can have on the environment. However it isn't enough. The best way to avoid all impacts in the backcountry is simply to not use soap. A hot wash cloth or sand and pebbles can get most debris off. Hand sanitizers are good to use after using the restroom. Poor hygiene isn't being encouraged. Poor hygiene in the backcountry can lead to some serious consequences. According to the National Outdoor Leadership School, 60 percent of its students drop out because of illness caused by poor camp hygiene. "The pristine character of the wilderness environment often lures students into a sense of false confidence, believing that sound hygiene is unnecessary and that all water is safe to drink," notes the NOLS Wilderness Education Handbook (Harvey, 1999, pg 212).

Dr. Bronner's Soap, is made from all natural materials, Water, Saponified Organic Coconut & Olive oils (w/ retained Glycerin), Organic Hemp Oil, Organic Jojoba Oil, Citric Acid, and Vitamin E. Not only are they natural, but 95 percent of Dr. Bronner's Soap ingredients is purchased through fair trade and the bottles they are sold in are 100 percent post consumer recycled (Phillips, 2008, pg 23). Bronner, the president of Dr. Bronner's Soap, laments:

Companies mislead consumers in conflating their detergent-based products with ecological biodegradable soaps, even calling these synthetic detergent products 'organic'. Dr. Bronner's Magic Soaps are real soaps made from real organic oils, while these other so-called 'Soap' products are detergents made from petroleum and conventional vegetable material. They are not soap, they are not organic, they are not natural. (Phillips, 2008, pg 23)



Dr. Bronner's Soap is a prime example that natural sustainable products can be made and effectively sold. If backpackers and campers feel that soap is a necessity in the backcountry then Bronner's is the prime candidate in environmentally safe cleanliness. It is also comes unscented which makes it even more effective in a hiker or camper's eyes. It would be one less thing to have to worry about raccoons getting into. Bronner's soap may seem a little more expensive than the leading brand and it is, but it isn't more than what it should cost. It is organic, recyclable, and the least impactful to the environment. It pays for itself. Not too much for today's U.S. citizens to spend a little more on. Citizens have money to frivolously spend on video games, designer shoes, purses and so can give a couple dollars more for a bottle of soap that will pay off in the future.

There have not been any recent developments in science that allow any type of soap to leave no trace to the environment, but it would be appropriate to use the next best alternative. Peru has suffered greatly from the use of detergents and soaps that aren't biodegradable in their waterways and have found a native species of plant that works just as well as detergent and other soaps, but isn't hurting the waterways as drastically as before. The formula for the new soap uses the resin extracted from the fruit of the plant known as Boliche. The formula doesn't include any high petroleum saturated products or perfumes. It is also made in smaller batches, but can clean just as much as larger standard sized batches. The process of producing the soap also allows the recycling of the residues that is produced after extracting the resin from the fruit. The resin is used in the production of mud or earth blocks to use in construction (Dooms-Goossens, 1996, pg 72). Peru has found an environmentally sound way of solving their polluted rivers with the discovery of Boliche. It not only provides a cheaper and environmentally sustainable way of producing an effective cleanser, but it also provided a severely poor country with jobs to produce

the product. We shouldn't ship in Peruvian soaps, but such accomplishments by a less technological country should be commended and be an encouraging example for others to follow.

There are soaps out there that are more biodegradable than others. Choosing the right one is difficult and may cause more research than is necessary. Producers should just be committed to doing what's right, but money is more important to companies. Asking the government to make companies adhere to stricter policies of ingredients is the next step in creating cleaner waterways. This would make companies unable to use phosphorous at all in their cleaning products, even if it is below one percent. If all companies adhered to the same rules nationwide then there would be no escape of detergent makers to another state. Statewide regulations are a good start to catalyze bigger realizations for consumers, but it is only as far as the borders of the state that those regulations would apply. There is no benefit in using phosphorous in the water ways other than a short cut in making soap. The soap's effective consistency is unaffected without the use inorganic materials in all areas including, smell, texture, and production. There is no benefit or repercussions for soapers to switch from petroleum-based surfactants to oleochemical-based surfactants or vice versa "over the long haul," says Janice Mabe, director/base surfactants at Huntsman. "Both materials deliver similar, if not identical performance" (Farquharson, 2008, pg AL8). However, the United States is notorious for putting a band aid over a consistent problem and this isn't an issue that will fix itself, but it is a problem that is directly caused by humans. This is another example of many other dilemmas people are faced with every day to choose: what is better? Choosing a better soap, is not helping the environment sustain itself, but also leaving the consumer with a truly lighter conscience. Without

people realizing that they are holding the responsibility of the future's environment, it will continue to gradually impact the wildlife and water systems negatively.

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