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SENIOR PROJECT, SPRING 2011
UNIVERSITY OF CALIFORNIA, DAVIS**

A NEW EFFICIENT CULTURE

A SIMPLE GUIDE FOR ADJUSTING YOUR DAILY LIFESTYLE....



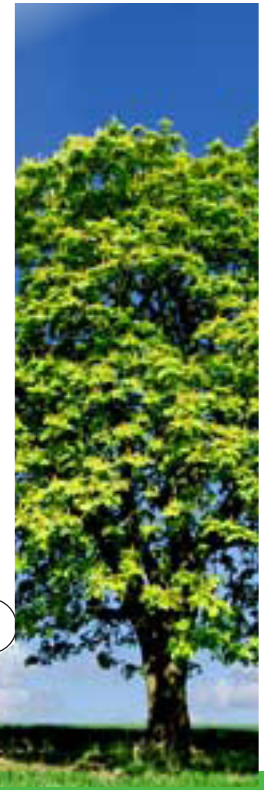
TO BENEFIT YOUR TIME, HEALTH, ENVIRONMENT, AND MONEY!



IDEA/INTRO

Our current economic situation can be compared to the Great Depression. While our culture has gotten comfortable with uncontrolled growth and inflation, the recession actually gives us a great opportunity to slow down, conserve and restore a sense of value in products and property, having more efficiency in the way we do things. Americans are being forced to save money. This can and should be the driving force behind a behavioral change of our wasteful habits, creating a more efficient culture including reducing, recycling, and reusing products and the financial benefits they create. This will both directly and indirectly affect the health of the global environment and the landscape around us.

Culture is constantly evolving. In order to ensure it moves in a positive direction it should be guided towards a more sustainable future. As landscape architects it is our job to make “Green” a part of our permanent culture not just a phase or fad that ultimately fades away. We must preach it to our youth and all corners of society. The foundation for change is creating simple guidelines and values that become part of everyday American life. We have skipped this foundation and gone straight into complex details of building a sustainable future. Fortunately, unlike a physical building it is not too late to go back and address our fundamental problems. Great ideas of simple ways to save money, time, effort, and health will spread like germs in our modern culture traveling by Internet, airwaves, and electrical wires having an uplifting effect on humanity. And just like microorganisms, minute and notorious, these small seemingly insignificant values are misunderstood and actually a critical part of the health of our ecosystem.



POTENTIAL PROBLEMS

UC Davis and the Landscape Architecture/Environmental Design Department opened my eyes to how our culture's tendency towards waste contributes to environmental degradation. I thought about how the lessons I learned growing up, if applied by the greater population, could help reduce human detriment to the environment. The attitude of our modern culture and the values of my family are much different. We have a disposable culture where items are used once and then thrown away. This is a product of our "fast and easy" surroundings. Drive thru's and single use products appeal to the human tendency to take the easiest path, focusing on short-term personal goals while sacrificing the long-term health of the greater culture, economy and environment. These tendencies were outlined in Garrett Hardin's "Tragedy of the Commons":

"The individual benefits as an individual from his ability to deny the truth even though society as a whole, of which he is a part, suffers."

Modern attitudes have evolved to idolize spending and growth. My generation has been trained to admire those with the means to obtain and the carelessness to waste. "Ballers" and "High-Rollers" are roll models. Shopping sprees for the newest fashions and trends are coveted. Old items are looked down upon and quickly replaced. Those who save or have even a hint of conservative attitude are labeled "cheapskates" or "pack rats". My grandfather would be routinely mocked for his careful spending and ridiculed for keeping things that people considered old or junk.

Many of the ideas in this report are practiced in low-income situations. These behaviors are implemented out of necessity and are often a source of embarrassment. The social stigma of "being ghetto" has created a culture that abandons common sense. We must remind ourselves that being smart is more important than being "cool". Are we parasites, consuming all we can obtain, leaving nothing behind but waste? Or can we be positive contributing members of a functioning ecosystem? The modern example unfortunately points toward the former, but there is hope. Humans possess the unique ability to look introspectively and make necessary, immediate changes that can benefit



both the short term and long term health of our species. The time for that change is now.

There is a lack of widespread understanding stemming from a lack of education, especially of our youth. If parenting is failing in this aspect, we must as a culture work to lift awareness, so that these lessons become parallel with the lessons of safety and health that are rarely forgotten in parenting. A result of our cultural deficiencies is a diverse ideology about the importance and impact of environmental issues. Many environmental movements are already underway which can make people think that there are already solutions to the problem, people working to fix them, and that they don't really need to do anything. People may rebel against environmental ideals as too liberal or may believe interest groups fabricate these problems. Some people may believe that sustainability is just too expensive for the average person to address or participate in. There are also more immediate concerns for people especially in lower income communities. These issues can include safety, food and shelter, maintaining steady employment, and caring for loved ones. While these people may be practicing these behaviors only out of necessity they may not realize the overall benefit or have the education to take pride in their efficient behavior. As environmentalists, urban planners, and landscape architects look to the latest lingo and trends, the sustainability movement may be coming and going without the average person even aware.

“The rational man finds that his share of the cost of the wastes he discharges into the commons is less than the cost of purifying his wastes before releasing them.”

-Garret Hardin, “Tragedy of the Commons” 1968

Supposed environmentally friendly products are popping up in all aspects of daily life. Greenwashing refers to the terms “green” or “sustainable” and how they are often too loosely used to make a product or company seem to be environmentally conscious when the proposed practices may not truly be environmentally beneficial. While “green” in some aspect that is advertised, the practice may have hidden contributions to environmental degradation in another. While it's good to see any movement towards a more sustainable future, environmental designers should question if this movement is sustainable in itself. Will this trend become a permanent culture change or will it fade like other so many other aspects of our culture



that are exploited by media and big business? Media and corporate marketing exploiting these environmental concerns may dull people's sense of stewardship towards the land. Young people will rebel against media exploitation as they always have. This may be our most concerning problem as the youth are the ultimate ticket to the future culture change we require.

PLAN

Only getting a fraction of production from a resource should be considered a failure. Only getting a fraction of the planet's population practicing sustainable habits is a similar failure. The small collective efforts of many are greater than the large-scale efforts of a select few. Sustainability isn't only found in the giant wind turbines or vast solar farms. It doesn't have to be the most advanced alternative fuel vehicle technology. It can be simple, affordable, and available to the average person. If we are to achieve our highest level of sustainability these alternative behaviors must become part of our culture. The only way people will change is if they want to change. So we must ask ourselves, what will make people change? While we would hope that environmental or health concerns would be enough that just isn't the case. People will only show concern if the environmental issues are clearly visible and obvious. Many of our climate issues are unseen and by the time they are obvious to the average person, it will be too late. We must appeal to money and use its steady value to people as the vehicle for change. This will draw the most attention from the widest audience, which is the ultimate goal of the project. By creating a guidebook to show how simple changes in daily habits can save many, time, effort and health we can utilize the "fast and easy" culture by accentuating the benefits of adjusting daily habits.

The guidebook will avoid greenwashing by downplaying environmental benefits. Accentuating cost, time, effort and health effectiveness is the best way to sell the new ideas, even though environmental issues are a core reason for the behavior modifications. The guidebook will avoid commanding language and guilt trips, which can turn



the reader off and create a rebellious attitude towards its message. It will simply state facts and differences between old and new ideas and describe how the new ideas can save time, effort, health, the environment and especially money. It will avoid vague, generalized phrases that have become too common. Phrases like “Save the Earth” and “Help the Environment” are not specific enough and will produce denial, as people will not immediately understand how these small tasks can make such a large difference. Instead the book should be more specific. For example “reduce deforestation” or “conserve water” will be used. The explanation of the ideas will be presented quickly and simply to prevent losing the reader who most likely has been conditioned to ignore these types of messages. The information will grab and maintain the attention of the diverse group of readers. It will appeal to a diverse audience, targeting all ages, education levels, social statuses, ideologies, and political views. It will accentuate the impact of individual efforts and acknowledge those who do their part. One important goal of this project is to create a sense of pride in the product of these behaviors. The American idea of a successful life should include these practices. Backing this idea with positive reinforcement will help sell the message of the small individual effort. Although the ideas may seem miniature in scale to the reader, the multiplication factor attained when these practices become the social norm will be monumental.

“Education can counteract the natural tendency to do the wrong thing, but the inexorable succession of generations requires that the basis for this knowledge be constantly refreshed.”

-Garret Hardin, “Tragedy of the Commons” 1968

PRODUCT

Are you efficient? Do you get the full potential out of your money, time, and effort? Many of our daily habits are supposed to make our life more convenient they may actually do the opposite. Single use items create waste that we and environment have to deal with. Wasteful behaviors cost us money in cleanup, taxes and utility bills. Even if that “throw away” product is cheap, the reusable one doesn’t usually cost much more. And when you reuse something it will pay for itself over time in saving you from buying more disposable items.

When we litter, waste and pollute, it may be easy and seem insignificant at the time but we pay a much bigger price in the end.

Taking care of your environment has been proven to provide more than just aesthetic value. Studies have shown it to reduce violence, crime, mental fatigue and stress. Caring for the landscape creates territoriality, which is a sign to others that you care about your surroundings. It also provides a sense of pride in your surroundings, creates a sense of place or home which reduces stress and increases happiness. In other words, you make a statement with the way you treat your environment (Kuo 343)(Doeksen 243). We can utilize what we have in everyday life to be more efficient. It can be anything. Be creative! Before you throw something away ask yourself if there is any way to re-use it. Ask yourself if it can be recycled, donated, or used in a way it wasn't originally intended. If not, you've lost nothing. If so, you have saved money, time, effort, the environment or all of the above. We don't have to give up our luxuries in order to be more financially and environmentally responsible if we just begin to be smarter about it. If you want to know how to save money and help your environment here are a few easy tips...

ENERGY EFFICIENCY

1. Dressing for the weather

We can utilize electronic devices like smart phones, iPads, or any device with an Internet connection to get on demand weather updates. Most smart phones come with a built in weather application. The days of waiting for the news, or waiting for the radio weather update are over. Keeping up with the weather and dressing appropriately is easy and can reduce air conditioning and heater usage in our cars, offices and homes. This will save gas and energy costs while also reducing pollution from excess gas consumption and energy production. As for the car, air conditioning loads are the most significant auxiliary loads present in cars today. They are higher than rolling resistance, wind resistance, and driveline loss. The power draw air conditioning uses is equivalent to the car traveling 35 miles per hour. The fuel economy of a car drops substantially when the air conditioner is on (Johnson 1).



Guidebook Cover

Wearing dark colors, heavy materials, and full coverage designs in hot weather, then flipping on the air conditioner is very counter productive and unfortunately widely accepted in our modern world. Although you should flip on the air conditioner every once in a while to keep it working properly, You can reduce daily gas costs and increase horsepower by using it less often. Wearing Jackets, gloves and scarves in cold weather has somehow become too simple in our modern world and too often we

head straight for the heater. The average electric heater costs about \$0.61 per hour. Making an eight-hour day cost just under \$5 (Electric Heating). And an average month cost about \$150. Central heaters using natural gas can cost up to \$0.47 per hour, making the estimated monthly cost over \$110 (Resource Smart). Turning down the thermostat just two degrees in winter

and up two degrees summer can save 2,000 pounds of carbon dioxide per year (Who We Are). Layering up and opting to leave these luxuries off is cheap, easy and can avoid all of these costs.

2. Night cooling

During those hot summer days the household takes in heat through windows, doors and dark colored rooftops. In the evening, before cranking up the air conditioning to cool the house off you can utilize the natural cool air that takes over when the sun goes down. Creating a draft by opening multiple windows and doors and placing fans in a uniform direction can quickly sweep that warm air back out and replace it with cool night air. You can avoid running the air conditioner and save on energy costs while helping to avoid sweeping blackouts and electricity production costs. You can also maximize the life of

your air conditioning unit by using it less and saving costs on maintenance like filter changes. Fans are the more cost effective and environmentally friendly choice. Running a fan only costs about one cent an hour while running a single room air conditioner 7 hours a day will cost about \$44 a month. Air conditioners also contain coolant, which can be harmful to the atmosphere. They require a much more complex manufacturing process, which adds to their latent energy. The cost of a low-end air conditioner is just under \$100 while you can get a simple fan for as low as \$10 (Bartels, 1,2).

3. Your Body's Quick-Cooling Spots

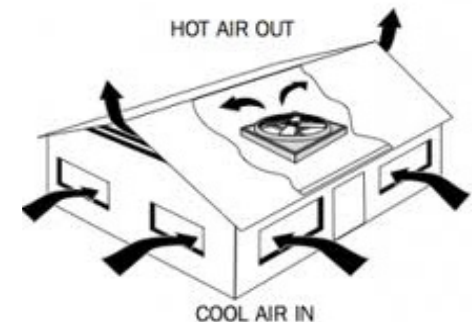
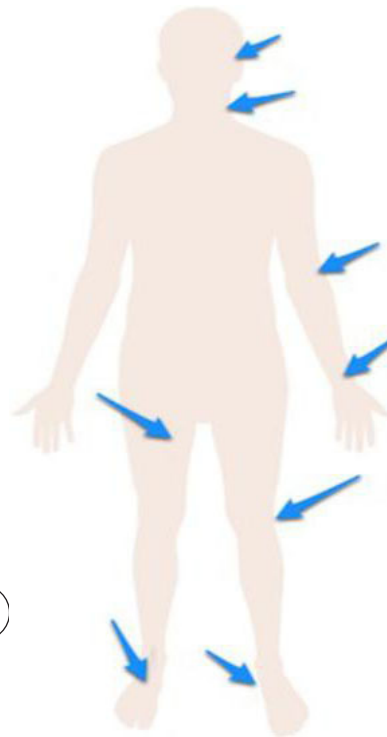
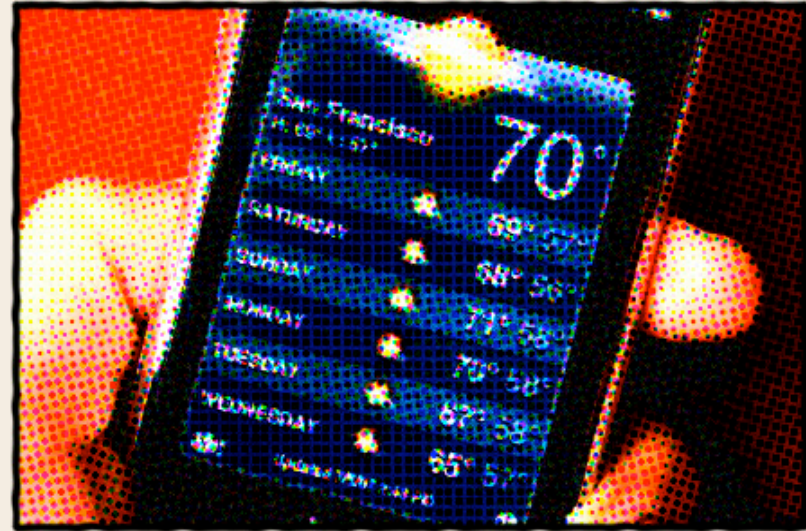
The human body contains a few areas where blood vessels pass close to the skin. The top of your feet, ankles, behind the knees, inner thigh, wrists, inner elbow, neck and head are some of these areas (Whitson). The arteries and veins carry large amounts of blood to and from the heart and on to the rest of the body. Cooling this blood can cool your body down relatively quickly. On a hot day before you crank up the air conditioner take out an ice pack or cold wet rag and wear it on one or more of these areas. This can delay the need to crank up the air conditioner and reduce energy costs and production. Turning a small fan towards you while doing this will create a simple air conditioner. Also, remember to leave heat producing appliances like the stove, oven, dryer, and dishwasher off on those hot days.

Central air conditioning is the single biggest user of energy in the home, even though it is only used part of the year. Costs can average over \$1000 per year (Home Energy).

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4. Christmas Décor

Decorating your house for the winter holidays





is one of the most meaningful and joyful times of the year. Unfortunately it takes a toll on the environment and your wallet as many times decorations are purchased and disposed of every year. Buying a real Christmas tree can cost \$20-50 a year. It also creates an environmentally harmful industry as trees are grown, cut down, and shipped long distances to make it to your neighborhood. Trees are overproduced which results in unused and wasted trees. The land

that is used for tree farms was many times previously natural habitat. To help reduce these problems you can buy an artificial tree for as little as \$85 at stores like Walmart that will last you a lifetime. You may even be able to find a used one cheaper on websites like Craigslist or eBay. Although it is a little more of an investment upfront, your purchase will pay itself off in a few years. You also don't have to deal with disposing of a real tree every year and you don't

have to worry about introducing unwanted pests that could be living in that real tree. If you simply must have the real thing, try not to tinsel or flock your tree. These practices consist of one-time use products and chemicals that contribute to pollution and waste and worst of all leave your tree non recyclable.

Christmas lights are another long-standing tradition in America that takes a toll on energy production and costs. There are many alternative options for decorating that do not require electricity. Things like artificial wreaths and other reusable, colorful decorations express your Christmas spirit without electricity. You can also get creative and make your own decorations out of supplies lying around the house. The options are only limited by your imagination. If you must have lights at night make sure to use LED lights.

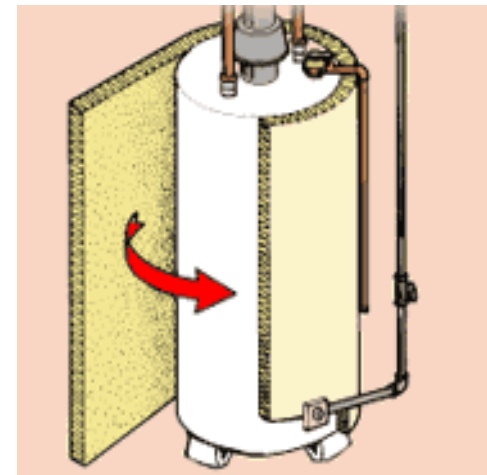
Lighting a six-foot tree for twelve hours a day for forty days with LED will save 90% or more on energy costs compared to incandescent lights. LED's also run cooler so there is less risk of fire. They have a lifespan of about 20,000 hours or enough to last 40 Christmases. If all Americans switched to LED lights, we would save about \$410 million in energy costs. (LED)

5. Close the Fridge

Refrigerators and freezers account for 1/6 of a home's total energy use. Opening the door accounts for \$30-\$60 of a family's yearly energy bill (Who We Are). While you're standing in front of the fridge with the door open deciding what to eat, cold air is spilling out of the bottom and being replaced with the room temperature air. If you've ever opened the fridge barefoot you know exactly what this means. After you grab your food and close the door the compressor has to run to cool that warm air again. That means more energy used and more money on your bill. Try thinking about what you want before you open the fridge and grabbing it as quickly as possible. Refrigerators cost up to \$200 a year to run and 7% of that is based on the average amount of opening the door (Aparicio) (Resource Smart) . The more you open it, the higher that percentage will be. Remember, that cold air is basically money spilling out on the ground.

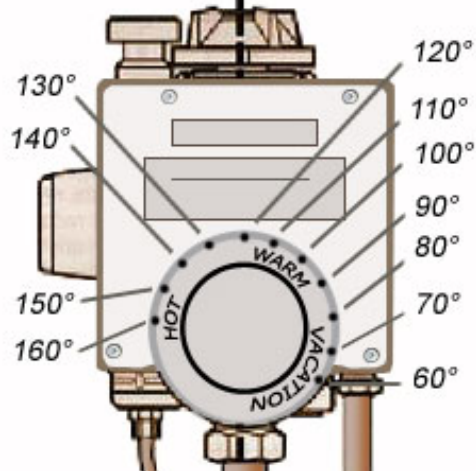
6. The Water Heater

Water heaters can account for 14%-25% of the energy used in your home. They work by keeping a tank of water heated at all times and on standby waiting to be used. As the water is waiting to be drawn to the faucet, heat is being lost out of the



How to Read a
Gas Hot Water Heater Control Valve

DANGER RANGE **SAFE RANGE**



sides and bottom of the tank. You can reduce this energy loss by using a water heater insulating wrap or blanket. If you're not sure if your water heater needs a wrap a simple test is to just touch it. If it's warm then it needs insulation. This can reduce heat loss by 25%-45% saving you 4%-9% in heating costs. It is simple and inexpensive. You can find pre-cut wraps from \$10-\$20. Some utilities even offer rebates and install them for free (Insulate).

The simplest way to reduce water heater costs is to simply turn down the temperature gauge on the unit. Most water heaters are set at 140° F when they only need to be at 120°-130° F. Lowering the temperature also reduces the chance of scalding and helps your water heater last longer. Doing this can save you \$76-\$143 per year (Take the Home). Another way to save energy is to install a tankless water heater. This

type of water heater doesn't have a standby supply of water to maintain. It super heats cold water as it passes through the device. That's why they are also known as "demand" or "instantaneous" water heaters. The electric versions of these are more efficient than the gas versions. They can be 24-34% more efficient than storage water heaters (Demand).

7. Wash Cold

Try to make a habit of washing your laundry in cold water whenever possible. Sometimes you will have that nasty stain that needs hot water but many times we forget that we don't need hot water for all loads. Washing your colored clothes in cold water instead of hot saves on the energy needed to heat the water. It also helps your clothes to keep their color. Using cold water instead of hot water can save 80%

percent of the energy required to wash clothes (Who We Are). Save money on your utilities bill by reducing the amount of hot water you use.

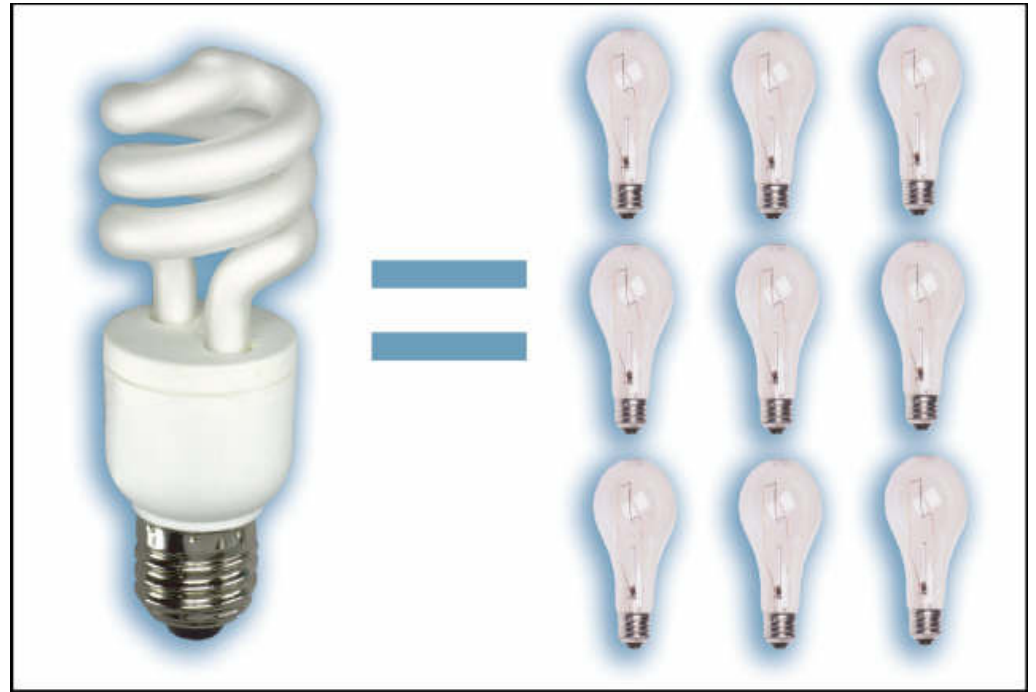
8. Home Electronics

Even while idle, many electronics use energy to keep displays, clocks and remotes controls working. Make sure your devices and electronics are turned completely off when not in use. Your computer or laptop's "sleep mode" reduces energy use by 60-70% over "screen saver" mode but still uses more energy than when its completely off (Who We Are). Check your settings and make sure your computer goes into sleep mode after a short period of inactivity and shuts off after a longer period. 5-10 minutes is generally a good setting for sleep mode. A good way to test this is to turn off all the lights at night and pay attention to what is still lit up.

Try turning appliances and devices that use electricity completely off or even unplugging. This will save you money on unnecessary energy usage and utility bills. You can save about \$10 per light switch per year simply by turning it off when you're not using it (Take the Home).

Utilizing the Microwave ovens use about 50% Less energy than conventional ovens (Who We Are).

90% of the energy used by incandescent lights is lost as heat. The remaining 10% produces light. Compact fluorescent bulbs are 4 times more efficient. By replacing one bulb. You can save 150 pounds of carbon dioxide per year. Compact Fluorescent bulbs also last 10 times as long (Who We Are). Replacing 10 old bulbs with CFL's will save your \$57 per year

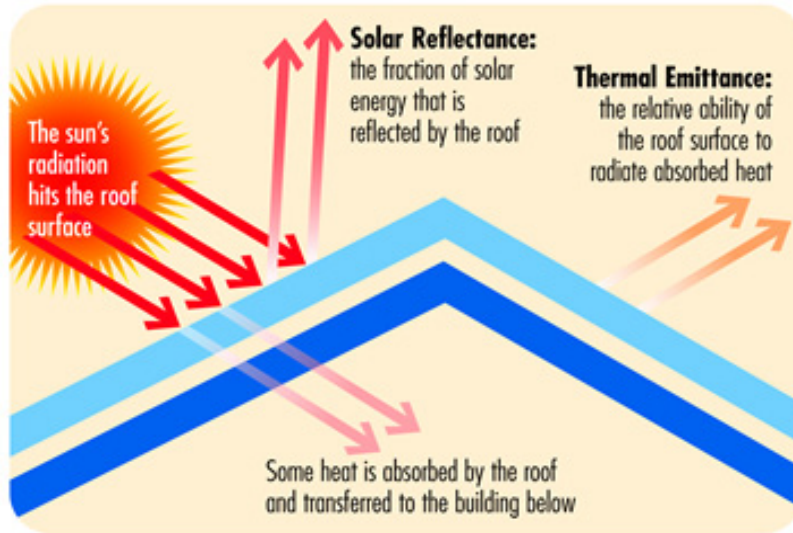


(Take the Home).

Sensor lights are a great addition to any yard. Not only do they reduce the amount of energy you use by turning off after a set period of time, but they are more convenient as you don't have to find the light switch. They are also safer as you always will have a quick and easy source of light and most importantly they serve as a security measure to light up your yard if someone is trying to sneak around your yard

9. White roofs

The next time you have to get your roof fixed, make sure to utilize white colored roofing materials. If you live anywhere south of Michigan or Minnesota, you can save money on energy costs by reflecting the sun's heat and light away from your roof instead of absorbing it with dark colored roofing. The lighter colored materials cost an average of only 15% more but will save 20% on air conditioning costs. If every roof in the world was changed to white over the next 20 years it would save the equivalent of 24 billion tons of carbon dioxide emissions, that's about what the entire planet produces in one year. Many state offices and local utilities offer financing, and the Environmental Protection Agency's Energy Star Program offers a tax rebate. White roofs can increase the life of your roof also. Roofs wear for two reasons, wet and dry cycles and heat cycles. You can dramatically reduce the heat cycle your roof goes through every day by simply utilizing the right color roof (Urban & Roth 1-6). Just like wearing a light colored shirt on a hot day, your house or building can reduce the amount of heat it absorbs by "wearing white" (Barringer).



10. Outer window shades

Outer window shades are a brilliant way to keep the sun's heat out of your home. They work by blocking sunlight before it passes through the window, slowly radiate and still heat up your home like a greenhouse. This new variation of window shade is not common yet, but can be found at Costco or online anywhere from \$30-\$100. You could be one of the first in the U.S. to utilize this technology that's already being implemented widely in Northern Europe. Some of the most sustainable cities in the world like Copenhagen, Denmark and Malmo, Sweden are using this technology regularly.

If you can't afford this or are not in the market for new blinds you can still save by simply staying on top of when to open and close your blinds. You can save up to \$35 per year by keeping them open in winter to accept solar radiation and closed in summer to block it. This practice can complement your heating and cooling systems (Take the Home).

11. Insulation and Sealing

Air leaks can account for up to 25% of total heat loss from a home (Who We Are). Re-caulking or weatherstripping is a cheap, simple fix that can be done relatively quickly. Sealing, doors, window, vents, and ductwork with caulking can save you \$212 per year (Take the Home). Preventing air leaks saves energy and money and makes your home more comfortable and durable (Air Sealing). Air sealing and insulation complement each other and work together to save energy and money. Insulation also complements





our heating and air conditioning system, allowing them to work less to achieve the desired temperature. Adding 15” of insulation to your attic, walls, and basement areas can save you \$241 per year on energy costs.

GENERAL EFFICIENCY

1. Signage

You can spread the message of your fiscal and environmental responsibility by creating signage around your home or workplace explaining new practices. This not only helps you remember the practices, but it also creates a more efficient system as visitors and family members will learn the new behaviors of your home or office and be more willing to follow the steps. You can explain to others how these practices are benefiting your wallet, your time, health, and the environment while simultaneously becoming a grass roots supporter of the movement towards a more efficient culture.

2. Support Local Business

Patronizing the local mom and pop store instead of the giant chain store can benefit the local economy. Economic prosperity is a critical part of sustainability (Loux). When small businesses are successful jobs are created and the local economy is boosted. While the wholesale or warehouse store may have cheaper prices, they are often a farther drive, and they often offer a lower quality of service and product as the local store. Visiting a local small business is more likely to create personal relationships, which go a long way in keeping you happy. The loyalty created by these relationships creates a



more flexible adaptable business that is more likely to survive tough economic times. A successful small business pays higher amounts in taxes, which are often put directly back to the local community. The more successful small businesses there are, the more likely that one will grow into a large corporation and create more competition in the larger economy (Brown). Farmers markets are a great way to support local business. In North America, fruits and veggies travel an average of 1,500 miles before ending up at your house. You can support fresher, more flavorful, and more nutrient rich products by purchasing at the local farmers market (Who We Are).

3. Diluted Drinks

If you're not a fan of plain water when you're thirsty or with your meal or your child likes some flavor in their drink, try watering down your juices. Most modern juices are chalk full of corn syrup, sugar substitutes and unnecessary calories. You can cut these in half by treating the thick drinks like a concentrate. This makes the drink healthier by adding more water and diluting the sugar and calories. It also makes often-expensive juices last twice as long, saving you money and trips to the store.



PLASTIC EFFICIENCY

1. “No, Thanks” to Plastic Bags

Most of us have that drawer in our kitchen that's overflowing with plastic shopping bags. If you're thinking environmentally or fiscally you are saving them to re use in some way, but there always seems to be way more than needed. The problem starts



from the checker or bagger at the grocery store who has been trained to put everything and anything in a bag for the customer. Although they're simply doing their job as trained, many times they bag single items or a few small items that we really could carry out by hand. And many times they don't ask you if you even want a bag before they give you one. The U.S. uses 100 billion plastic bags per year that use about 12 million barrels of oil to produce. Less than 1% of those bags are ever recycled (Who We Are). These plastic bags are not allowed in your municipal recycling, you have to return them to the store or just throw them away. If you want to avoid this waste and that messy drawer full of plastic bags try to make a habit to tell them "No thanks" before they throw your stuff in a bag that will end up in the landfill or floating around somewhere in the habitat, like the Great

Pacific Garbage Patches. These are large areas where ocean currents swirl and collect garbage. Plastic bags and such collect in two massive patches, the Eastern version is said to be twice the size of Texas (Kostigen, para. 1). If you want to avoid adding to this excess waste you can bring your own reusable bags or you could utilize the carts they provide to wheel your larger items out to the car. You can also try to get rid of those annoying bags you've already collected by using them as small garbage liners or as "doggy duty" bags for walks with your best friend.

2. Water Filters and/or Reusable Water Containers vs. Plastic Water Bottles

One of America's most wasteful and unfortunate habits is consuming single use plastic water bottles. We pay about \$5-\$10 for a case of 24 plastic packed water bottles when we have one of

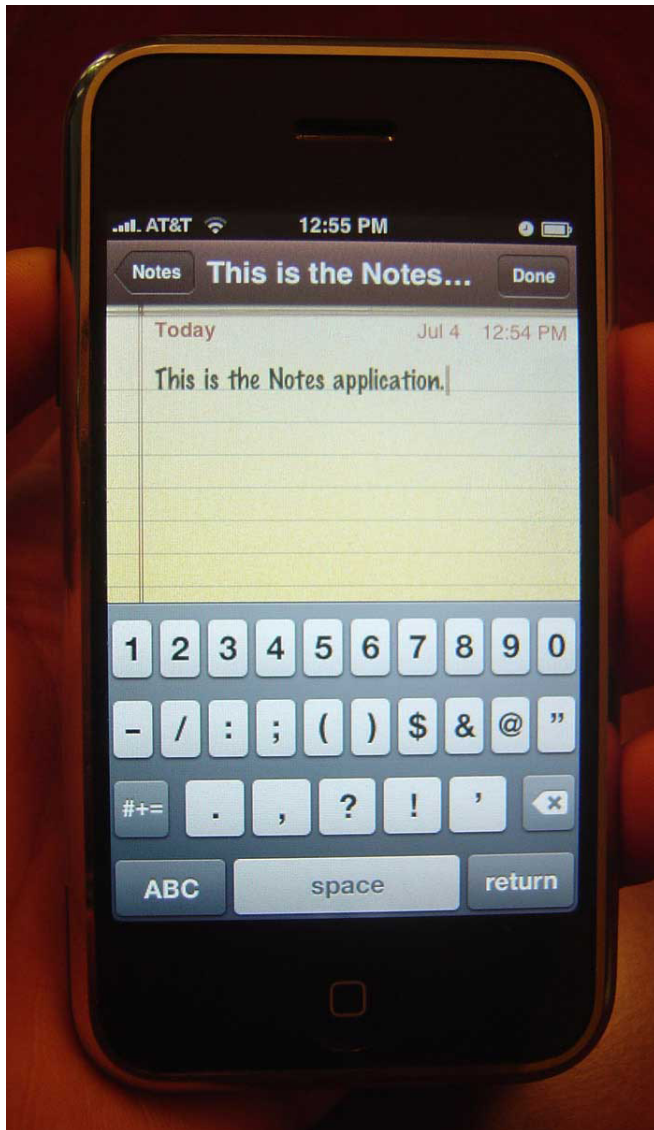
the cleanest tap water systems in the world that is completely free. Bottled water is not as simple of a product as it seems. It goes through a surprisingly complex process to get to our hands. First it is transferred by vehicle to a treatment center where it goes through its cleaning process. Then it is shipped to the bottling center, where petroleum based plastics go through an intense manufacturing process before being filled with filtered water. It is then transported again to the store where it is purchased. It is consumed and deposited into the sewer and on to a very complicated sewage treatment plant. The bottle is then recycled, reused or thrown away where it sits in the landfill for many years before decomposing. In the end the cost for water bottles is 10,000 times more per gallon than simply drinking tap water (Loux).

In most cases bottled water is of no better quality than tap water. Tap water is just as clean and safe to drink. All municipal tap water is subject to the Safe Drinking Water Act and is constantly and thoroughly tested for any harmful contaminants. It is filtered and treated with chlorine or similar disinfectants to eliminate any harmful microorganisms and to ensure its safety and even treated with fluoride to improve our dental health (Ingham, 1). The only thing tap water is lacking is the needless shipping and wasteful bottle production.

You can buy a reusable water container for as cheap as \$5 from just about any store. Reusable bottles, unlike disposable water bottles are almost always BPA free and will give you unlimited uses. When you have a reusable water bottle you also maximize the

Bisphenol A (BPA)-a chemical used in plastic food containers like water bottles for 40 years. While studies are being done to prove it, there's concern that it has negative effects on our health (Bisphenol A).





amount of water that goes into your mouth versus leaning over the water faucet and letting half of the water spill down the drain. You also give yourself a supply of water that you can take with you wherever you go or keep in the fridge for a quick cold supply. Some newer reusable water bottles have freezable pieces that can help keep your water cold and some even have a built in filter to help keep your water tasting fresh. If you are still not satisfied with tap water,

you can buy a faucet water filter attachment, pitcher water filter, or similar product that can clean your water even further. These products vary in price from \$15 to over \$100 depending on how sophisticated you want to get. They range from a simple activated carbon filters, which reduce organic chemicals, chlorine, and improves taste, to ion exchange resin filters, which also reduce copper and mercury, to even more complex systems.

PAPER EFFICIENCY

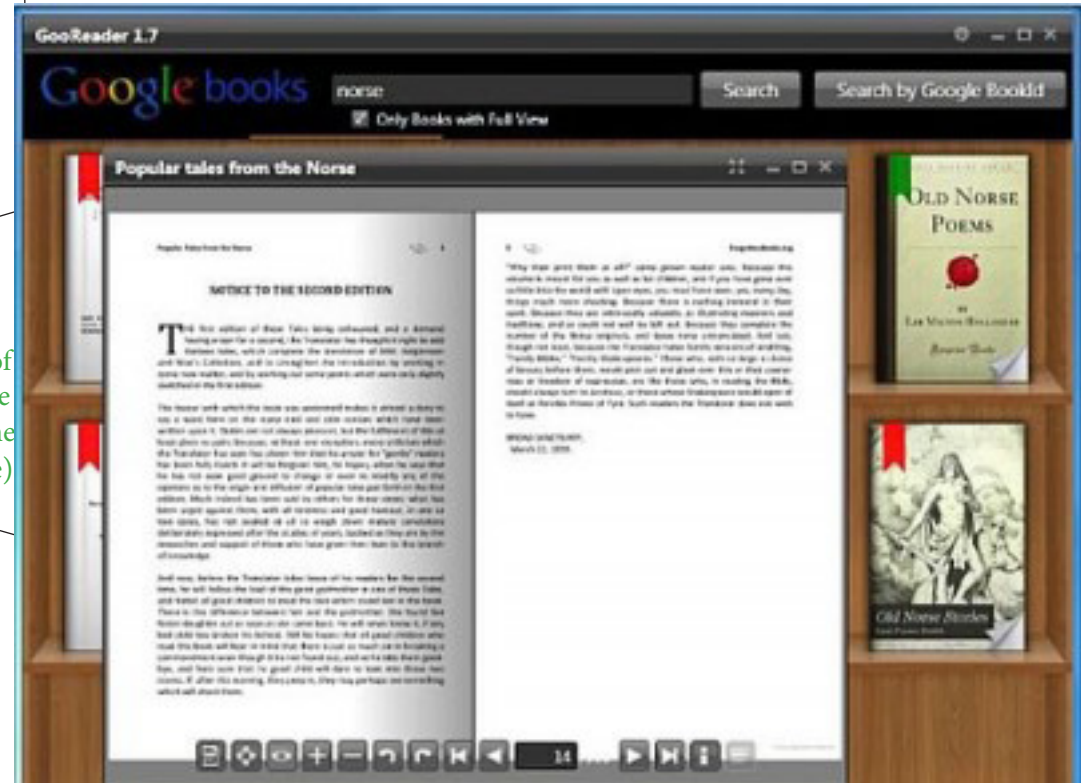
Even though trees can be replanted and some people consider them a renewable resource, the underlying plant and animal communities and their delicate ecological balance that have formed over thousands or even millions of years are not renewable (Paper Industry).

1. **Electronic Notes vs. Paper Notes**

Americans annual paper use per capita is about 700 lbs. or about 2 pounds per person per day (Engle, 32). Most electronic handheld devices like iPads or smart phones offer application for keeping notes electronically. Utilizing this option can reduce

paper waste and the cost to buy it. It also eliminates the need to find a pen or keep one handy. It's more convenient as you can type in words quickly and correctly using auto correct. Many devices even have voice recognition so you don't even have to type. Reducing the amount of notepaper you use and throw away saves it from ending up in the landfill and reduces the amount of trees needed for producing paper. While paper is relatively cheap, about \$1.99 for 100 sheets at a store like Office Max (Notebooks & pads), using your electronic device is completely free. Paper and paperboard made up the largest portion of U.S. municipal solid waste in 1994, representing 38.9% of the total waste by weight. A number that undoubtedly has risen in the past two decades as population has grown (Recycling Resources). Paper manufacturing is also the 3rd largest user of fossil fuels worldwide (Garner). We can reduce these numbers by utilizing our portable electronic devices, making our lives simpler, cheaper and more sustainable.

One average tree can absorb one ton of carbon dioxide over its lifetime (Who We Are)



2. Newspapers, Books, and Magazines

Virtually all major magazines, books, and newspapers are available in a digital version. Many magazines and newspapers offer an online version of their product. Some are free to any user like National Geographic Magazine, which offers archived issues dating back to 2005 at no cost (National Geographic). Some only require a quick registration, and some offer a digital only subscription for a discounted price. Utilizing the online versions can save you on subscription costs, save paper, and the effects of mass shipping on the environment. Apple offers the application "Newsstand" on their products that allows you to download newspapers and magazines often for free.



There are multiple ways to obtain digital versions of books. Apple has the application “iBooks” that keeps a digital “bookshelf” with all your downloaded books. Some of these digital books are free but many require a purchase. The Amazon Kindle is a similar device dedicated to electronic books. If you’re concerned with keeping the information provided, you can always save digital copies on your computer, a memory stick, or external hard drive and print them out whenever needed. Every year in the United

States, over 2 billion books are published, 359 million magazines are published 24 billion newspapers are published (Recycling Resources). In 2008, the U.S. book and newspaper industries combined destroyed 125 million trees, not to mention wastewater that was produced or its massive carbon footprint. We can reduce our paper waste by taking advantage of our new, improved, digital technology. And if you don’t

have or can’t afford one of these devices, you can still utilize the absolute most sustainable way to read your favorite publication, that’s at your local library (Hutsko).

3. Cloth Instead of Paper Towels

You can save an estimated \$200 a year by using washable hand towels and rags instead of paper towels. This amount includes the cost to buy and routinely wash the towels (Chait). Reusable items like cloth towels can last many years and slowly progress their way down from sanitary hand towels to cleaning towels, to real grimy work tools. This is a much more efficient use than the one-use paper towels that we have become comfortable with. Paper towels are often non-recyclable due to soiling. If you want to be even more efficient, when your old shirt or pair

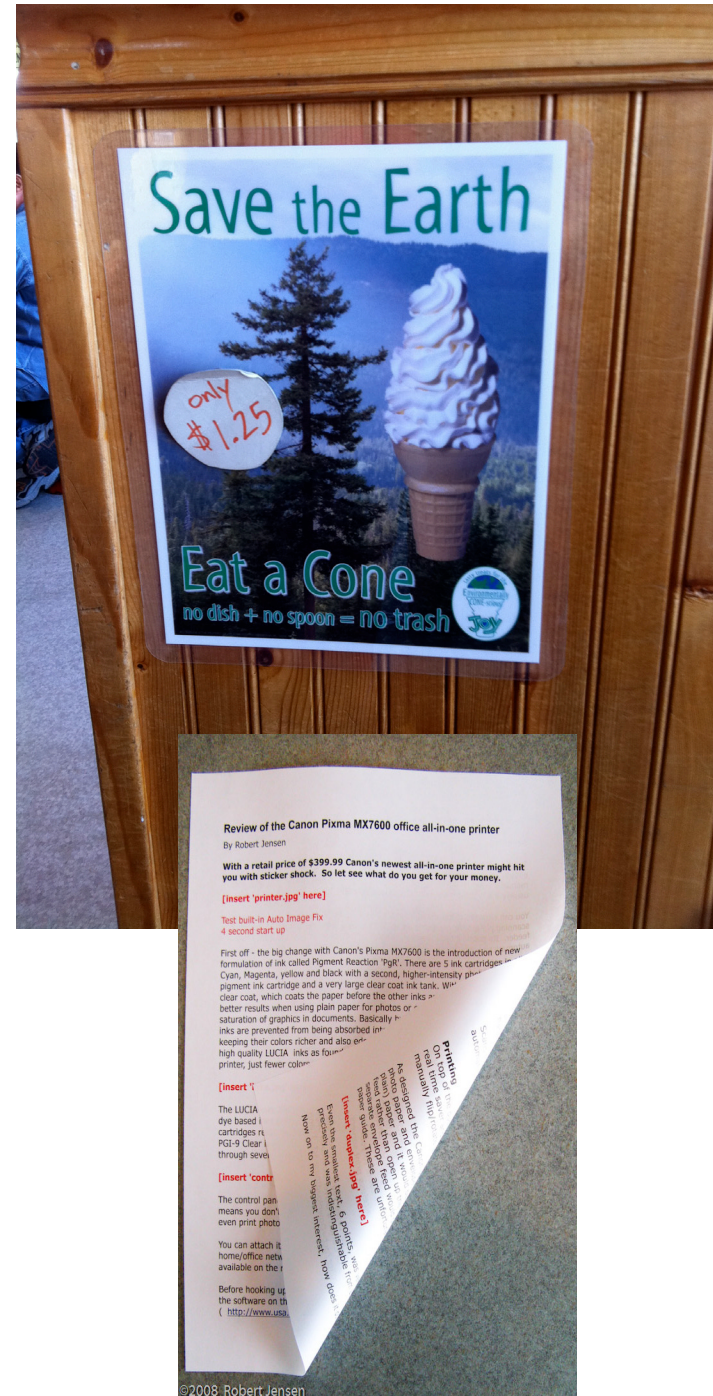
of socks are overly worn, torn, or get a permanent stain, you can wash them one last time and use them as a perfect cleaning rag. Even if you only use them once, instead of throwing them away immediately you can give them one last valuable use before sending them off to the trash. These items are great tools for cleaning up spills, dusting, or working on the car. Socks work perfectly as a rudimentary gloves and are great for cleaning hard to reach places. You can reduce the amount of paper towels, sponges or other common cleaning materials you use and save money and trees!

4. Cone or Cup?

The next time you get the itch for a cold treat on a warm day, asking for a cone instead of a cup can reduce the amount of garbage you produce. No paper cup, no plastic spoon, and nothing added to the landfill. Plus, you even get a bonus crunchy snack added at the end. Even if you don't finish the cone and end up throwing it out, the cone is much more biodegradable than that plastic spoon and paper cup. In 2010, 55.6% of all non-durable waste produced in the U.S. was paper or plastic (Municipal Solid Waste). Imagine the amount of garbage reduced if paper cups and plastic spoons weren't even offered. Not to mention the reduction in petroleum and trees needed for production.

5. Double Sided Printing

With the right printer and a few mouse clicks you can reduce your paper use by 50%. Check to see if your printer has the double-sided print option when you go to print. It may be in the advanced tab of the print menu, or a checkbox right on the



Welcome to Online Billing



main dialogue box. If you're in the market for a new printer look for this option as it will save you money on printer paper while saving many of our precious trees. The average U.S. office worker goes through 10,000 sheets of paper per year (Who We Are). U.S. businesses consume an estimated 21 millions tons of office paper every year. If offices throughout the U.S. increased two-sided printing from the 1991 figure of 20% to 60%, they could save the about 15 million trees (Goldbeck, xv).

6. Online statements

Paper billing creates about 2 million tons of carbon dioxide per year (Who We Are). Just about all businesses have a paperless billing option. With email and internet, there is really no reason to waste paper with paper billing except for the fact that people are often set in their ways. Many people are afraid of losing valuable data that they keep filed away. This data could just as easily be lost in a fire. The safest way to protect your files is to digitize them and keep them on multiple hard drives, thumb drives or discs. This logic eliminates any need for paper statements. Some people feel they will forget to pay their bills without a paper statement in the mail. Whoever is billing you would be happy to send you a text, email or even give you a call to collect their money. By simply informing them of your notification needs and your desire to eliminate paper bills, you can eliminate all the wasted paper and trees they produce.

TRAVEL EFFICIENCY

The majority of summer air pollution in major metropolitan areas comes from vehicles. The most effective way to prevent air pollution in your area is to stay out of your car. You can eliminate up to a pound of pollution per day by not driving. Smog is not only caused by cars it's also caused by gas powered tools, paints, industrial emissions, charcoal lighter fluid, and household spray products. Air Pollution can cause breathing problems, respiratory irritation, coughing, wheezing, chest pain and headaches. It can aggravate chronic respiratory diseases like asthma and bronchitis and ultimately impair your immune system and cause increased hospital visits and costs (Summertime)

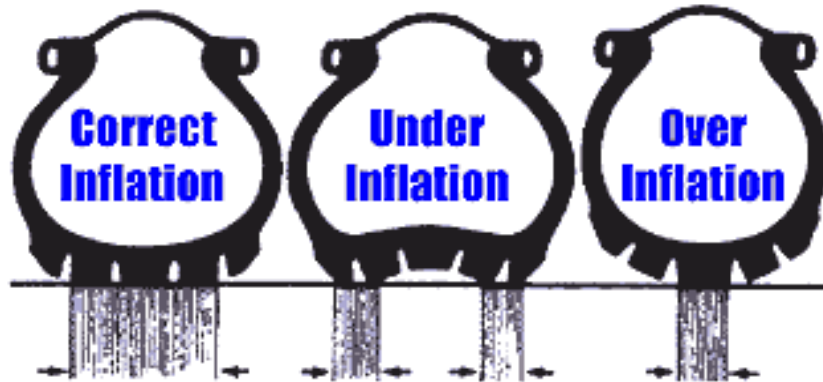
The majority of water pollution in metropolitan areas also comes from cars. Exhaust particles settle on pavement and get washed into the bay or settle directly on water, car leaks and wearing parts such as tires and brake pads leave toxic residue on the pavement. These pollutants get washed into the stormdrains during storms and excessive water use.

Each year in the U.S. 180 million gallons of used oil end up in storm drains and in the local water body, 16 times the amount of oil from the Exxon Valdez spill (Keeping). Smoking vehicles make up about 10% of cars on the road but produce 50% of pollution in the air, that pollutions eventually settles and ends up in our water.



1. Where the Rubber Meets the Road

Keeping your vehicles tires inflated to the proper



level has many benefits. It creates a uniform contact point with the road across the full length of your tire, meaning more traction. Underinflated tires contact at the two edges of the tire while overinflated tires have a thin, central contact point. Whatever the make or model of your car, proper inflation improves your gas mileage by 3.3%, which is equivalent to about \$0.11 a gallon (Gas Mileage). Saving gas means reducing our dependence on foreign oil and the countless problems that entails. Proper air pressure makes

“Clean air is preventative medicine on a grand scale”

-James Hill, V.P., Kaiser Foundation Health Plan, Inc.

driving safer, provides better handling, and also extends the life of your tire meaning fewer tires you have to buy (Tire Replacement).

You can also maximize the life of your tires by rotating them periodically. The general rule is to rotate your tires at every oil change, although the importance of this

procedure is not nearly as widely known as oil

changes. Rotation allows the tire to wear evenly as different wheel positions experience different forces (Ortiz). When your tire wears too much on one side it must be replaced for safety reasons regardless of the amount of tread on the opposite side. Reducing tire consumption means less disposal of rubber and less of the many environmental impacts of tire production of tires. Tire production requires large amounts of raw materials like rubber, carbon black, oils, chemicals, textiles, and steel. It also consumes energy, produces wastewater and releases emissions that can be toxic and carcinogenic. (Nokian 7).



2. Quality Air Filters

Part of the routine maintenance of your car is changing the air filter. This is an important step as “breathing” is a crucial part of the internal com-

bustion engine. The most common air filters, like so many other things in our culture, are cheap and disposable. They start at about \$5 and are made primarily of paper and are thrown out every 10,000-20,000 miles, depending of the car and the driving conditions. There are reusable filters on the market that are actually better for your car like those made by K&N Filter. These are lifetime filters that come with a one million mile guarantee. Reusable filters are made of higher quality materials and provide a 1-4 increase in horsepower. They promote a healthier engine by providing better airflow while protecting it from foreign particles. They do have to be cleaned every 50,000 miles. Cleaning includes washing and re-oiling. While a bit more expensive up front (\$20-\$60 depending on make/model) they will last much longer and extend the life of your vehicle (K&N). They also vastly reduce the amount of waste produced from the rubber, metal, paper, and plastic used in filter production. Lifetime filters drastically reduce consumption which means less production and transportation waste. (Goldbeck 3)

3. **Bicycling**

Bicycling is the single most efficient mode of travel that currently exists. It is relatively fast, requires no fuel, and provides exercise to the user. Utilizing your bike for trips around town or even farther will save you on gas money, while reducing wear and tear on your car and giving you a good workout. You can use Google maps and map your bike trip out online before taking off. Many cities are moving towards making bicycling safer and more available with wider bike lanes and designated bike routes. A new bike can be as cheap as \$80 brand new. And even cheap-





er used. Although bicycling may be looked at as a kid's activity in much of our culture, gas prices and the dwindling economy are forcing many people onto two wheels. Many countries in Europe have embraced bicycle culture and have created a sense of bicycle pride in their communities. Cities like Amsterdam and Copenhagen fight for the right to be called the bicycle capitol of Europe. Although bicycles are not the popular mode of transport yet in America, there are

some small movements. In Northern California the teens and young adults are taking a creative approach to their bikes. They call them "Scraper Bikes" and it's basically any way to customize or personalize your bike. Paint, colorful tape, custom framing can be seen all over bikes. It has become an art form and young people are showing their extensive imaginations and design skills while promoting bicycling in metropolitan

areas. In Davis, California biking is the most common form of travel for not only students of the University of California but permanent residents as well. They have an extensive "bike loop" spanning the perimeter of the entire city. Davis is also home to the U.S. Bicycle Hall of Fame. We may not all want to turn our bikes into art pieces, but we should all realize the health, money, and environmental benefits of utilizing our bikes instead of cars.

4. Public transport

Another form of transport that has been under utilized by our culture is public transport. While many large communities have subway or rapid transit systems that are used heavily, there are still many more cars on the road than people in trains and buses especially in smaller cities. You can easily map out a public transportation map on your smart phone

utilizing “Google Maps” or “Google Transit”. By just entering your destination and starting point the application will show you where the stops are, what bus or train number and the time it will take to get to your destination. You can also find transit schedules on the internet or at the local transit center. Public transport is still very cheap and will save you on gas money and wear and tear on your car. It is also better for the environment and reduces all the pollutants that come out of cars.

5. **Carpool!**

Carpooling is a good way to save gas, save wear and tear on car, and save money on toll bridge costs. In many cities, they offer a “carpool lane” that is designated for carpools only. It saves time on the ride to work and the stress of having to sit in traffic. Carpooling also gives you the opportunity to socialize with friends, family or coworkers during the ride. The best method is to rotate drivers so everyone has their fair share of driving and gas costs. While your saving yourself from driving everyday you can utilize that time to eat a quick breakfast, make an important phone call or do some work on your laptop. Or you can just sit back and enjoy the scenery.

6. **Telecommute**

Working from home and utilizing modern technology like email, video conferencing, and internet can allow you to avoid physically traveling at all. You can spend more time with family, lower stress, and save on gas and car maintenance by avoiding traffic and other problems associated with commuting (Summertime).





7. Trip-Linking

Non-commuters make up 75% of auto travelers. Short trips around the corner for errands and recreation can emit half as much pollution as a ten-mile drive. Make sure you trip-link or consolidate destinations into one trip when you travel to avoid excessive cold engine starts. A cold engine pollutes five times as much as a warm engine (Summertime). It's always nice to kill two birds with one stone plus excessive starting and stopping of your car is harder on your engine and other parts.

8. A Well Maintained Vehicle

Keeping your car tuned up will reduce its effect on the environment, provide better gas mileage, horsepower, and extend the life of the car. A poorly tuned car pollutes 10-15 times more than a well-tuned car. One way to check is to watch for leaks under your car where you park. Staying on top of leaks will keep your car engine cleaner, reduce the amount of fluids you have to buy, and keep car parts running smoothly (Keeping).

Many newer cars call for an oil change every 5,000-10,000 miles instead of the traditional 3,000 miles. Check your car's owner's manual and see if you are wasting time, money and oil by changing it too often. When dealing with your car's fluids make sure to use a drip pan or plastic sheet to catch spills (Yolo).

When cleaning your car make sure to use towels and rags to wipe brake dust and other toxic residues. Use rubber gloves and dispose of both in the garbage. Washing these residues with water or chemical sprays pollutes the stormwater system and

your local water bodies. Many chemical sprays use toxic solvents that are also directly harmful to your health.

WASTE EFFICIENCY

1. Product Reuse Vs. Buying New

The Internet gives us a new and awesome way to reuse and resell used items. In past times you would have to set up a garage sale or run an ad in the newspaper to get rid of unwanted stuff. Now websites like craigslist and eBay make getting value out of your used things better than ever. From your home you can have a sale that reaches around the globe instead of a few block radius around your house. If your buying its great too. You can find local items on craigslist and save money on shipping. Often craigslist item are cheaper because they're local and people just want to get rid of stuff like a garage sale. eBay can be a little more expensive because of fees and shipping charges, but you can shop from home and find just about anything you can imagine. If you are a collector of any sort there is no comparison to eBay for finding rare collectible items.

Local thrift stores are a great way to get a used item and save it from the landfill. You will be surprised at the quality of things you can find and how cheap they are. Its like an all day, everyday garage sale. You can also donate your things if you don't want the hassle of selling, going on the internet or dealing with buyers. Many thrift stores have a great cause for their profits and will pick up your items for free. You can also use the old method of



craigslist



the local newspaper to advertise used items and find good stuff at a cheap price. Whatever your method its always cheaper to buy used when its appropriate. It saves more than you can imagine on the latent energy of products.

2. Reusable Food Containers and Supplies

Using reusable food containers like “Tupperware” will save you money on buying “throw away” containers like plastic cling wrap, plastic storage bags, aluminum foil, and paper bags. The average use of cling wrap or aluminum foil is about one square foot or enough to cover a plate (Rastogi, 1). On Walmart.com, a 35 square foot box of aluminum foil costs \$3.50, 100 square feet of plastic cling wrap costs \$2.50, and various plastic storage bags from 30-100 count can be found for just under \$3. On the same site

there are three options for reusable container sets all costing just \$2.60. These containers are the only option of those mentioned that have unlimited uses, are freezer, dishwasher and microwave safe. Using this style container avoids adding to the landfill and saves you money versus the one-use alternative. The average kid’s school lunch produces 67 pounds of waste each year (Who We Are). Most of this is prepackaged, processed food. These foods not only have wasteful byproducts, but they are usually not healthy snacks. A general rule: if it’s in a prepackaged container, it’s probably unhealthy. If you have to pack it in a reusable container, most likely it’s a more healthy option.

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There are also many restaurants, especially fast food, that utilize rigid plastic containers and utensils that can be reused at no additional cost.



These usually end up in the garbage after one use. Reusing these plastics even a limited number of times or for a non edible use, delays their path to the landfill and saves you money on buying containers new.

Most of us stopped using lunch pails in grammar school, but why? They reduce the amount of paper and plastic bags and containers that we have to buy and throw away everyday. Newer lunch containers are insulated and keep your food at a more stable temperature. Many are rigid to keep your crushable snacks like chips and bread safe. If you pack your lunch, do yourself and your environment a favor invest in a reusable lunch pail. They last forever so you can even get trendy and find a rare collectible one on eBay, although they might be a little pricy now! Maybe we should have kept those things after all...

Instead of using disposable plates, cups and utensils at your next event, use washable ones instead. You will save money on buying and re-buying disposable ones. All you have to do is wash them and their ready to go again. You wont have to deal with excess trash and you will be doing the environment a huge favor by not contributing to paper and plastic production and not adding to the landfill. Reusable supplies be stored and saved for special occasions only or utilized in your daily life. Either way the option is much better all around.

3. Recycling!

You can earn money easily in your home or business by creating separation stations for your recycling and taking your bottles and cans to the local buyback center. Add a garbage can or two next to





the normal trash and put a simple label on them. Have one for aluminum cans, one for plastic bottles and one for glass. Let people add to your “piggy bank” and then cash it in when you need it. In California, we pay into California Redemption Value whether you like it or not, so why not reclaim your money? Or you can let the kids earn their allowance while simultaneously teaching them a valuable lesson about helping their environment.

Make sure you're recycling bins are easy to see. They should be convenient and obvious. Label them with easy to read signs. Using clear bins will also allow users to see what kinds of recycling you want inside. Place recycling bins next to each trash can to make it convenient to separate. Make sure you have a bin next to the printer, fax, and mailbox for paper and one in the kitchen for bottles and cans (Recycle 9) Recycling 1 ton of paper saves 7,000 gallons of water, 3 cubic yards of landfill space and 4,100 kilowatt-hours of electricity (Who We Are).

Support recycling programs, as more people get involved and the demand grows more programs will be created. Many cities have great programs like free recycle bins, free labels, at home pick up, hazardous waste, appliance, and yardwaste removal, electronic recycling, and free home recycling assessment. Utilizing programs already in place is the easiest way to recycle and shows that you are doing your part to help the community and your environment.

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4. Hazardous Waste

These days throwing away just anything isn't ok. Local and regional governments are addressing

hazardous waste with many laws and programs. Putting TV's, monitors, microwaves, batteries, or fluorescent lamps in the garbage is now illegal. These items are accepted for free at the local landfill or recycling center. California law also requires stores must accept your old car battery when they sell you a new one, or you can take it to the local landfill. Throwing any auto fluid in the trash or down the drain is illegal. Make sure to recycle auto fluids and filters at the local recycle center. Some cities offer a reward of about \$0.40 per gallon for used motor oil. Cell phones can be recycled at any cellular store (Recycling 5). Many cities provide free pickup of hazardous waste materials for seniors or disabled persons (Recycling 6). Some cities charge based on amount of garbage produced, so the more you recycle the less your bill will be. If you see someone disposing of hazardous waste illegally, report them to the police immediately. They are polluting the entire area that is shared by your and your loved ones.

Mercury is a toxic heavy metal that can accumulate in wildlife including the fish that we eat. Recently, the California Department of Health has advised people in the San Francisco Bay Area to limit their consumption of local fish. Mercury can damage the human brain, spinal cord, kidney and liver. It is especially dangerous to unborn babies and small children. A significant source of mercury is from human waste of fluorescent lamps, thermometers, thermostats, automatic light switches, relays, gauges, button batteries, novelties, and some rubber flooring and tubing. We can reduce this threat by using mercury free products and disposing of mercury properly at your local recycle center (What Is)(Reducing)





5. Rechargeable batteries

Batteries can cause serious health hazards for people and the environment when thrown away with municipal waste (Who We Are). It is illegal to throw them in the trash in many cities. Find your local battery recycling center to avoid this pollution to your surroundings. To help reduce some of this waste you can invest in rechargeable batteries. For only a few dollars more you can get nickel cadmium batteries that can be recharged numerous times, saving trash, hazardous waste and your money. A recharger is necessary to buy, but it can be used forever and with any kind of rechargeable battery?

6. Save the food!

Remember your parents saying, "Eat all your food! There are starving kids out there who would love to have that meal!" While the guilt filled message may be old and tired, people are really still out there starving. Not to mention the amount of labor, livestock, and latent energy needed to produce an average meal. Luckily there is an easy way to get rid of that guilt and not have to hear the lecture in the back of your mind, and you don't even have to stuff yourself to clean your plate. It's pretty simple to ask for a to-go box or to save the rest of that home made dinner you couldn't finish and save it in the fridge. And the best part is you have a nice microwavable snack for later. In fact, cutting your meal in half can be good for your health. Eating smaller and more frequent meals can help keep your metabolism up, which allows you to burn calories and your blood sugar steady, which gives you energy (Cheney). You could drop it off to that homeless per-



son on the corner on the way home, give it to your poor roommate, starving teenager or even toss it in your back yard compost bin (just remember no meat or fish!)

WATER EFFICIENCY

Water is the most valuable asset on our planet. It is 60% of our bodies and 70% of the earth (The Water)(How Much). Luckily in America we have clean potable water available anywhere and everywhere we go. If you've ever been on vacation abroad, you can appreciate this luxury. Many countries struggle to provide healthy water, you have to buy it bottled. In America, like so many other things we tend to and underutilize this valuable asset.

Wherever we live on land we are part of a watershed. All land is part of a drainage system that collects precipitation and drains into local creeks, rivers, wetlands, lakes, bays, and eventually oceans. Water must pass through our cities and developments on its path through the water cycle. As it does it collects pollution from cars, litter, chemicals (including mercury), and all of our daily activities. This is called urban runoff or stormwater pollution and it is the leading cause of water quality problems (What Is). Surprisingly, the average person is the biggest contributor to this pollution, not big business. If the water goes through the treatment plant, and many times it doesn't, motor oils, heavy metals, and toxic fluids can still end up in the watershed (Washing Cars). The end result is high amounts of chemicals and nutrients in our water bodies. These contribute to abnormally high al-



gae growth, which suck oxygen out the water. This is called Eutrophication. The anaerobic water becomes uninhabitable by most marine wildlife, destroys habitats and pollutes our fish stock (Our Watershed). Water bodies with excessive algae growth are become aesthetically NOT pleasing, cause bad odor, and are not fit for water recreation. Keeping stormwater clean prevents health risks and avoids costly cleanup (What Is).



1. Stop That Leak

Staying on top of leaky faucets, valves, pipes or hose fittings in your home or business is easy and can save gallons of water and lots of dollars. For example if you have 1 leaky faucet in your home that drips once every minute, it will waste 34 gallons of water in a year. If you increase that number to 3 leaky faucets dripping at 3 drips a minute, its now 312 gallons of water wasted per year and those are pretty conservative numbers considering the average leaky faucet (Water Science). Sometimes the fix is as easy as a new rubber washer, a twist of a wrench, or a new strip of plumbers tape.

If you hear your toilet running at random times throughout the day, it is probably leaking from the flapper. This is a very common fix and the part can be found at a store like The Home Depot for under \$10 (Flapper). It's a five-minute fix that anyone can do. For these simple fixes all you have to remember is to find and turn off the water shut off valve before taking any pipes apart. It is usually located outside in the front of the house at the first water faucet. These water saving tips are especially important if you live or work in a community where water billing is based

on usage. And remember, leaks can be indoors or outdoors so don't forget those outside water fixtures.

2. Short showers

This is an old water conservation lesson but it still holds true, reducing your shower time by a few minutes can save gallons of valuable water. A 10-minute shower uses about 50 gallons of water on a standard showerhead. You can do a lot in 10 minutes and it's probably more than enough to clean your body, face and hair. If you cut it down to 5 minutes you will use 25 gallons saving 50% of the water. You can also install low flow showerheads, which use about 25 gallons or less in 10 minutes and can be found for under \$10 (Conserving Water). A low flow shower head along with cutting down your shower time to 5 minutes and you're at only 12.5 gallons of water for your shower. That's quite an improvement from 50 gallons! An average family of four using low flow shower heads will save about 20,000 gallons of water per year. Some of the new shower heads have a quick shut off valve, which allows you to lather, shave, or brush your teeth without the water flowing and without losing your temperature setting. If you don't have this type of showerhead try not to do these unnecessary maintenances in the shower. Those activities really don't require gallons of potable water pouring on your back to complete. Either way, taking short shower is much more water conservative than baths, that take about 70 gallons to fill (Who We Are).





3. Turn off the faucet

With a flick of your wrist you can save gallons of potable water by turning off the faucet while doing things like brushing your teeth or washing dishes (100 Ways). You may have to flick the wrist a few more times but its well worth it to save valuable water that has gone through a gauntlet of treatment to become drinkable. You can save about two gallons of water per minute by turning the faucet off in these situations (Conserving Water). All it takes is to remember and put this tip to use.

4. A Jug of Water in the Fridge

When you need that cold glass of water and the faucet is running luke warm, it can take a while for the water to get to a cool temperature. Instead of waiting for the water to get cold and letting precious water that went through days of treatment run down the drain, simply keep a jug of water in the fridge so you have it cold and ready right when you want it. It's faster and more conservative as every drop of water will end up in your belly not down the drain (100 Ways).

5. Washing on the Lawn

If you live in a home with a grass yard you can get double duty out of your water by washing your car, pet, or other things on the lawn. The water will soak into and feed you lawn instead of going down the gutter and often into the local watershed, river, bay or ocean, carrying dirt and toxic chemicals. It recharges ground water, something vital for the environment and lacking due massive amounts of impervious areas in developed communities. Common turf grass is surprisingly resilient to heavy traffic and driving your car over it once a month or so will



not kill it. Turf grass will also create bioremediation of the heavy metals and contaminants that come off of your car or other dirty possession, keeping them out of the local water body. If you don't have a lawn you can wash on any pervious surface like gravel or pavers to get the same water conservation.

Try washing without soap if it's not completely necessary. Sometimes just water and a little more effort are enough to get things clean. Soaps are toxic to the wildlife in the watershed where they end up even in low concentrations and they promote algae growth, which contributes to eutrophication. You can save money and not have to buy soap by utilizing this tip. If you do use soap make sure to pour it down the sink not the storm drain so it can be sure to end up at the wastewater treatment plant. (Keeping)(The Bay)

6. Broom Vs. Hose

Even though it's kind of fun and easy to use the hose to spray off your hardscape, it uses gallons of potable water and costs you money. Use the broom and save water while also giving yourself some light upper body exercise (100 Ways). Spraying water down the gutter washes toxic chemicals like motor oil, pet waste, paint products, and pesticides into the sewer and into the local water body. This contributes heavily to eutrophication of our oceans resulting in unhealthy and dying marine communities.

When you have a spill, use kitty litter or sawdust to soak it up instead of spraying it down the drain (The Bay). After it's soaked up, you can sweep up the absorbent and throw it away or add more absorbent and reuse it. Oil and grease are toxic to





fish and can kill waterfowl by breaking down their feathers and exposing them to cold (What Is).

7. Lower Water Pressure

How much water pressure do we need to wash our hands and brush our teeth? In your bathroom you rarely need the high flow rate of water provided by standard faucets. The average home faucet uses about 2 gallons of water per minute (Conserving Water). If you can't afford or aren't interested in

changing to a low flow faucet, you can simply reach under your sink to the hot and cold water supply control valves that are normally turned fully on and close them (by turning clockwise) about 50%. This will cut your water usage in half and if you are billed by usage it will save you money!

8. Get the Most Out of Your Appliance

By running the dishwasher and clothes washer only when they are completely full you can save up to 1,000 gallons of water every month (100 Ways). Many newer energy efficient appliances have load size setting to avoid this problem but if you're not sure or you have an older appliance get the most out of it by utilizing it to its full potential. You may be using unnecessarily large amounts of water to clean small loads.

9. Fish Tank Water

If you have an aquarium you have to periodically change the water. Make sure you feed that water to your plants. The nutrients from your pet's waste are great fertilizer for your garden (100 Ways). It also reduces the amount of potable water you have to feed the plants. Giving this water to your plants also prevents it from ending up in the sewer

and the local water body where the high nutrient content contributes to eutrophication.

10. Waiting for Hot Water

While you're standing there waiting for the sink or bathtub water faucet to get warm, potable water is being wasted down the drain. You can rescue this water from the sewer by keeping a cup, jar, or small bucket handy to fill up with the unwanted cool water. You can temporarily set this water aside and put it to use later. Either put it in the fridge to cool down for a drink, or pour it in your houseplants, aquarium, or garden.



11. Toilet Tank Water

If you have an older toilet (before 1993) it uses between 3.5 to 7 gallons per flush. New toilets use less than 1.3 gallons per flush (Who We Are). If you're not in the market for a new toilet or you can't afford a water efficient, low flow model you can still reduce the amount that gets flushed by placing a displacement device in the tank. A rock, brick or similar item will displace the excess water and give you an instant, free, lower water use toilet (100 Ways).



12. Pet Water

When you change your pet's water bowl, instead of throwing that water down the drain, throw it on your houseplant or in your yard. Every little bit counts towards saving valuable water. It's just as easy to throw it somewhere where it can be utilized as it is to waste it down the drain.

13. Ice Cubes

When you drop an ice cube on the ground or



of throwing it in the sink, put it in a houseplant or throw it outside in the garden. The ice will slowly melt and water your plant. You can even put it in your pet's water bowl.

14. Permeable Paving

Impermeable paving increases stormwater runoff volume and speed. This increases erosion and adds sediment in waterways. Sediment can harm fish by clogging their gills and burying their eggs.

The sediment also creates unclear water that blocks sunlight available to aquatic life (What Is). By using permeable paving you can prevent this problem while also recharging groundwater. Water will flow slowly off your land and prevent erosion while becoming more available to plants in your yard. Examples of pervious materials are gravel, turf blocks, pavers or pervious asphalt and concrete (Detain).

15. Stormwater Retention

Retaining water on your property reduces flooding, erosion and protects the water quality of your local water body. Any trees you plant will filter water pollutants and reduce runoff by absorbing and storing water. Depending on the size, a tree can absorb up to 1,000 gallons annually.

Rain cisterns are collection bins, tubs or barrels that collect water from your downspouts and rooftops. They are great for collecting water for future irrigation. Just make sure you use the water or it infiltrates within 5 days as it can become stagnant and attract mosquitos. You can prevent this by covering the bins after a rain.



have a cup full of ice leftover from takeout, instead

Rain gardens are large shallow landscape depression areas that are designed to collect, filter, and utilize water to feed plants. They are easy to make and if you plant the right plants that are tolerant to your areas rainfall amounts, require little maintenance or irrigation. You can even divert your downspouts to these areas to reduce the amount of water that runs quickly to the storm drain and maximize the rain gardens potential. Make sure your soil is able to infiltrate a sufficient amount of water before installing a rain garden (Detain)(Perry).

YARD AND GARDEN EFFICIENCY

1. Compost

Composting turns certain kinds of garbage into nutrient rich, water retaining soil that can be used in your garden. Organic matter like leaf litter, kitchen scraps and peelings, used coffee grounds, paper towels, plant clippings, chopped twigs, sawdust, and other organic, naturally decomposing things. When using food scraps for compost, make sure you bury them in the pile don't just set them on the top. Creating a compost pile promotes a natural biologic cycle of decomposition that can save garbage from ending up in the landfill while also giving you some free planting mix. There are a few things you should never compost; meat, fish, bones, dairy products, grease, fat, oil, feces, diapers, invasive weeds, diseased plants or large branches. There are four simple steps to make





sure your compost pile is productive, odor free and rodent free:

1. Aeration- turn your pile every week or two to prevent anaerobic conditions and slow decomposition. This will end up in a slower process and a foul odor.

2. Temperature- A larger pile will yield a higher temperature. Higher temperatures will speed up the decomposition process. Internally the pile can be around 105° F. Smaller piles will not maintain high temperatures.

3. Moisture- The pile should be kept lightly moist but not soggy. Soggy soils are anaerobic. A light moisture will hold nutrient rich organic matter to the soil and promote decomposition.

4. Carbon-Nitrogen Balance- green materials tend to have more Nitrogen while brown compost materials tend to have more carbon. Try to keep a balance of about 2/3 carbon and 1/3 nitrogen rich materials.

Your pile should produce a usable mix in about 3 months. The finished product looks like a dark rich planting mix.

There are a few different kinds of composting that you can try. There is a compost pile or a simple pile of compostable materials. There is also worm composting, in ground composting and food digesters. (Recycle 12). Composting help a sandy soil hold more water and can loosen up a clay soil, essentially becoming a free soil amendment (Roberts S6).

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2. Cool Watering

Watering your lawn and garden in the morning when solar radiation is low will reduce the amount of water that evaporates before it can serve its purpose

(100 Ways). Morning hours are usually less windy which also reduces the amount of water wasted as mist. Setting your irrigation timing for the morning hours right before it gets sunlight will give plants the maximum opportunity to use the water during photosynthesis and evapotranspiration (Berger).

3. Hydrozoning

When planting or planning a garden design try to put plants with the same water needs together. This will create “hydrozones” where you can water the same amount without overwatering or starving different species. This will save water and create a healthier garden (Wilson).

4. Learn Your Irrigation Timer

By knowing how to operate your irrigation control unit, you can save water by making simple adjustments by pressing a few buttons. Set your timer for early morning to reduce evaporation and maximize water uptake by the plants. Adjust your timer to match the seasons. Summer months generally call for more water and winter months need less. Find out how much water you lose to Evapotranspiration by utilizing the California Irrigation Management Information System or CIMIS website. You can enter your location anywhere in California and find out how much water you lose everyday. That will tell you how much water you need to replace. If nothing else, make sure you know how to temporarily delay your system during rainy days. Nothing is more counter-productive than sprinklers working in the rain. (Wilson)

5. Mowing

Instead of raking, bagging and carrying your





lawn clippings to the yard waste bin you can leave them on the grass as a fertilizer. Many lawnmowers are self mulching, meaning they cut and re-cut the grass into small pieces before directing into the bag or back on the lawn. This is called grasscycling and it reduces the need for fertilizer. Grass leaves are rich in Nitrogen and quickly decompose giving those nutrients back to the soil and the turf (Recycling 12). Unfortunately, most people overwater, and over fertilize their grass to promote maximum growth. Over

fertilizing actually weakens the lawn by creating excessive and succulent top growth. This creates more work as they have to cut the grass more and usually dispose of the clipping in the garbage. Grass will still maintain its good color and texture with moderate watering and fertilizer, and it will reduce the amount you have to mow (GrassCycling). Longer lawns provide

more shade for the underlying soil. The soil

will hold more moisture for a longer amount of time (100 Ways). Try adjusting your lawnmower to a higher setting and watering less. Just remember the one-third rule, never cut more than one-third of the total length of your lawn. These steps will keep your lawn healthy and use less water. If you're worried about thatch buildup, grasscycling is not the cause. The part of grass that you cut, the blade, is actually the only part of the grass plant that does not contribute to thatch. Grass blades are 80-85% water and have very low amounts of lignin, which is what makes plants woody and tough to decompose. Make sure you're clippings are properly mulched or cut into small pieces to speed up decomposition.

If you can't or don't want to grasscycle, make sure to put those clipping into your compost bin, or use them as mulch in your garden instead of dumping

them. Grasscycling saves time from bagging clippings, saves money on fertilizer, provides Nitrogen to your lawn, reduces waste, and saves on the energy of waste management (Grasscycling).

If you're Looking for a new mower, think about buying a reel mower instead of a rotary mower. Reel mowers are often characterized as old style and harder to use but they are actually better for your lawn. Professionals use them on the most delicate parts of a golf course because they provide a much cleaner healthier cut. Modern reel mowers are very efficient and easy to use. They are cheaper to buy and maintain because they don't have an engine and don't require gas or oil. They are lighter and easier to use than most mowers. The only disadvantage is that they are not great for grasscycling because they don't mulch the grass. But you can still use the larger blade clippings as mulch for your flower bed or in your compost bin (Berger).

6. Native Drought Tolerant Plants

When deciding what plants to put in your yard, consider native drought tolerant species whenever possible. By using drought tolerant plants you can save up to 550 gallons of water a year on irrigation. These plants provide year round color without needing as much water and fertilizer as most popular ornamental plants (100 Ways). Native plants also provide the most appropriate habitat for all kinds of wildlife species. Native beneficial insects, birds and microorganisms have evolved with local plants for thousands of years and those plants promote the healthiest relationships.





7. Sustainable Weed Killers

Instead of spending money on chemical herbicides, which end up washing down the drain and into the local water body, you can use cheaper and easier methods to kill weeds. The simplest and cheapest way is using boiling water. Pouring boiling water carefully on any plant will kill it and help prevent future growth (Gavigan). Boiling water is much cheaper (considering the cost of energy to bring it to boil) and will also reduce the amount of chemical herbicides we release into our environment. Keeping your weeds from germinating is another great way to prevent them. Cutting, pulling, and mowing them removes their reproductive parts which means they can't multiply. This is a cheaper and healthier way to keep weeds under control than herbicides (Berger).



8. Utilizing Mulch

Spreading a layer of organic mulch in your garden and/or around trees and plants can help the soil retain water and keep the plant roots healthy (100 Ways). Water will sink beneath the mulch and be covered from solar radiation and wind, which are the main causes of evaporation. This will allow you to go longer periods between watering and reduce the amount of water wasted by evaporation. Mulch also prevents weed growth meaning less money spent on herbicides and less time pulling them out of the ground (Berger). A simple and cheap way to achieve this is to utilize your leaf litter. Instead of raking and discarding those deciduous tree leaves, let them accumulate and provide soil insulation. The leaves that you sweep off the driveways and walkways should be collected, mulched and deposited in planting areas. As they decompose they will enrich the soil and feed

the plants in your yard. For thicker, longer lasting mulch you can utilize wood chips. Heavier mulch is better for weed control. Clippings and leaf litter are lighter, decompose quicker and are better as temporary mulch and condition the soil as compost would. Mulch can also be used as a design strategy to designate plant beds from walkways or turf.

Sheet mulching is a newer variation where existing weeds are knocked down but not removed, a layer of soil amendment or compost is added, then a decomposable weed barrier like cardboard or thick layer of newspaper, and finally an upper layer of compost or light mulch about 2-5 inches thick. As the layers break down they add nutrients to the soil and become a great planting bed. For deeper rooting plants and trees you can cut holes in the cardboard or newspaper (Roberts S6-S7).

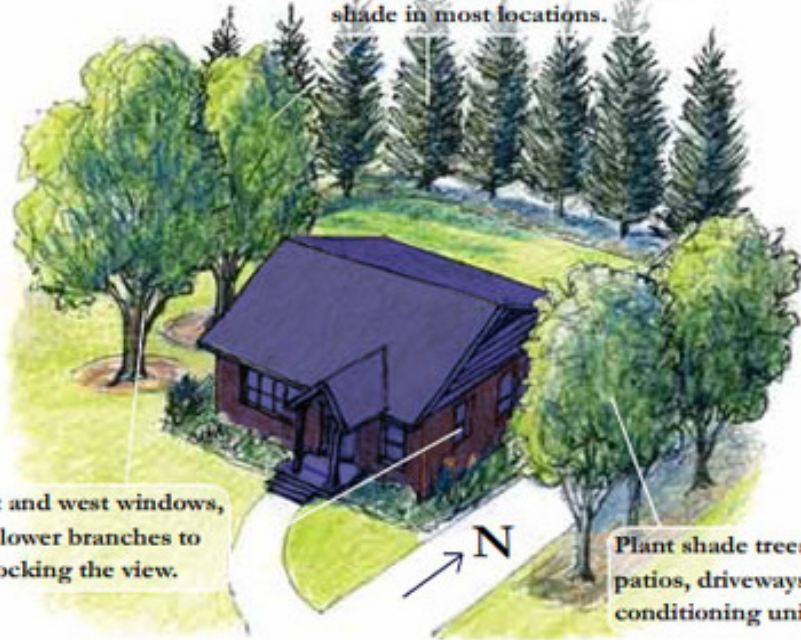
9. Irrigation

When planning your irrigation system make sure to use drip irrigation, or stream style sprinklers instead of spray. Drip or stream sprinklers use much larger drops of water and are usually closer to the ground so they reduce the amount of water wasted by mist and overspray. These options are not much more expensive if at all and are usually not installed simply because people aren't aware yet.

Once installed make sure to keep sprinklers adjusted correctly to prevent waste overspray. Spraying irrigation water over concrete or into the street wastes gallons of water and prevents your plants from getting the amount of water that the system was designed for. It is pretty obvious when there is an irrigation issue as you will get flooding over hardscape and dying plants from lack of water (Wilson).



Plant on the west and northwest to provide mid-to-late afternoon shade in most locations.



Shade east and west windows, but prune lower branches to prevent blocking the view.

Plant shade trees over patios, driveways, and air-conditioning units.

Make sure your irrigation system isn't overwatering. Signs of over watering are puddling or water spilling onto hardscape. Overwatering washes expensive fertilizers and pesticides out of your garden and into the local watershed. Fixing your irrigation issue may be as simple as adjusting some settings on your control unit or turning down a sprinkler or two (Our Watershed). Watering less is better than too much, you can always add water.

Always irrigate less than infiltration rate. A simple way to know if you're overwatering is if you get horizontal water movement instead of vertical. If water is flowing off of the turf or planting area, its time to turn the water down or off (Berger).

Contrary to popular belief, plant roots don't grow to "find" water. Roots only grow where water exists. If you water shallow and frequently water will only be at the upper soil levels. Watering longer and less frequently keeps the soil wetter at lower depths and encourages deep root growth. This creates drought tolerance and disease and stress resistance. It can reduce the amount of fertilizer needed for your plant and reduce its dependency on frequent watering. (Berger)(GrassCycling)

10. Strategic Tree Planting

Maximize Weather patterns around your home or business by planting the appropriate trees. All you need to know is your climate. In temperate climates, deciduous trees on the southern or western sides of your home allow sun's warmth in the winter and block its heat in the summer. These trees lose their leaves in the winter allowing more sunshine and warmth through but have full canopies in summer to block solar radiation. In cold climates, placing evergreen

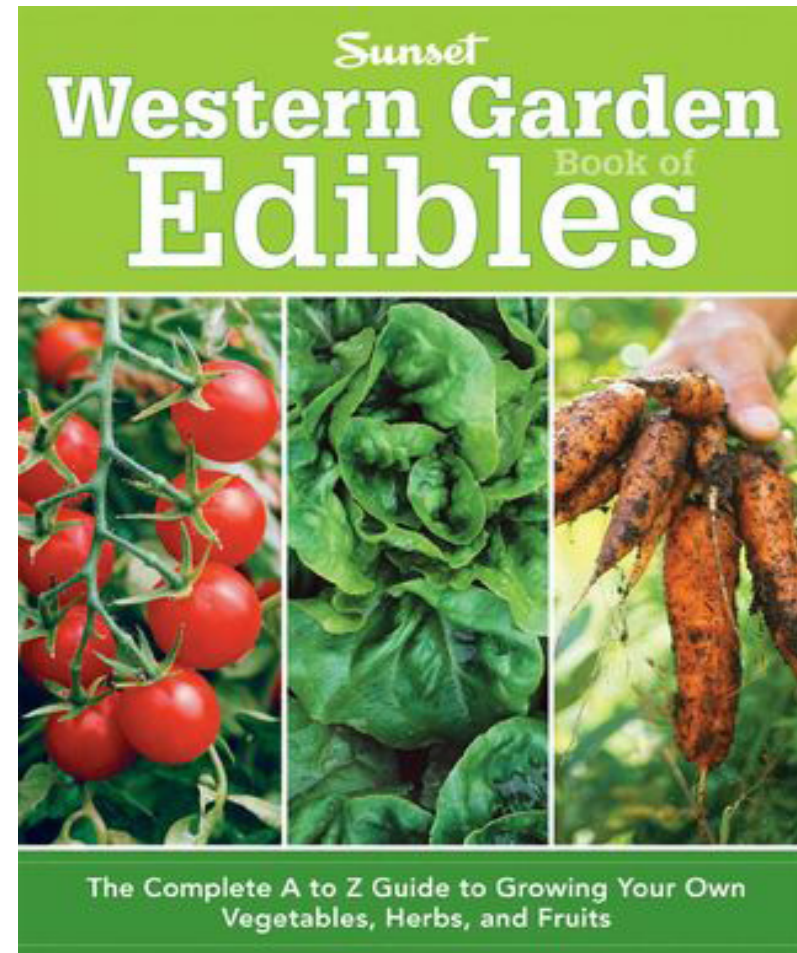
trees towards to the northwest allows full sunshine during long winters while creating a windbreak. In hot climates, plant evergreen trees to the southwest to block the sun's heat. Trees also cool their surrounding area by transpiration. So just having a tree in your yard cools the surrounding air up to 9° F and the underlying ground up to 25° F compared to nearby asphalt. You can reduce your heating and cooling needs for years to come by planting the right tree in the right place (Landscape Shading). Make sure to plant trees far enough away from your house as to not effect foundation. 2 to 5 times the mature tree height is appropriate (Landscape Windbreaks). Also remember your microclimate may be different from your regional climate. Slope and proximity to water effect microclimate (Landscaping).

11. Home edible gardens

An old and wonderful practice is utilizing your yard to grow food. Most people have forgotten that many of the foods you buy at the store, you could grow for free at home. You wont have to worry about what pesticides were used, what diseases they may have and how they have been genetically modified because you grew them yourself. Fruit trees, vegetable planters and herbs and spices will create a great environment in your yard while providing free and convenient food for you and your family. It will also cut down on shipping costs and the cost for you to drive to the store.

12. Integrated Pest Management

Integrated Pest Management is an approach to managing pests without or with very little toxic chemicals. This approach includes:



A. Monitoring- keeping a close eye on your yard for pests and diseases in order to quickly diagnose any problems and treat them before they grow into large problems. Part of monitoring is to keep records as many pest problems are recurring. You can find a Natural Enemies Pest Gallery at www.ucipm.ucdavis.edu to help you identify insects at different stages of life and determine if they are pests or beneficial insects.

B. Physical Controls- Includes practices like pruning diseased or infested branches and hand picking pests. Introducing a water source in your garden like a fountain or pond will attract beneficial insects and birds, which feed on many insects. Using bird feeders also attract insect predators. Providing shelter like vines or mulch provide protection for beneficial insects. (D. Joseph S4)

C. Biological Controls include utilizing beneficial insects like ladybugs, lacewings, spiders and some nematodes. Many pesticides not only kill pest but also beneficial insects that are healthy for plants. When beneficial insects are removed, pests can multiply and invade your garden more easily (What Is). Many times when you have a pest problem its natural predators are not far behind. If they are slow to respond you can buy many species at the local nursery. (D. Joseph S4).

For inside your home or greenhouse, you can utilize carnivorous plants like Venus Flytraps, Butterwort (*Pinguicula*) or Sundew (*Drosera*) instead of chemical bug sprays. Carnivorous plants will attract insects like flies and gnats, trap them and ingest



them. These plants are very simple to care for as most will do fine on the windowsill and get all their nutrition from the bugs. They do require reverse osmosis or distilled water, and prefer “wet feet” or a saucer filled with water under their pot, and they must go outside in winter in order to go dormant (Davis S8).

D. Cultural Controls- horticultural practices known to reduce pests like using organic and slow release fertilizers to encourage steady growth that is less attractive to pests. You can also use plants that are known nectar and/or pollen sources for beneficial insects. Utilizing a variety of native plants that bloom at all times of year is the best plant choice.

D. Chemical Controls are a last resort option and begin with the least toxic option. These pesticides can end up in the storm drain if applied too heavily, before a storm, in an over watered garden. Use less pesticides and never use them right before a storm, they will be quickly washed off, wasted, and end up in the storm drain where they also kill important aquatic organisms once in the water (Our Watershed). (A. Joseph S2)

14. **Aeration**

Lawn can become compacted easily if it has heavy traffic. Even if they don't, it's still a great idea to aerate your lawn periodically. Aeration relieves compaction and allows water and air to reach down into the soil. If you are fertilizing your lawn, aeration lets the nutrients get down directly to the roots. It also enhances thatch decomposition. Make sure you use hollow tines on your aerator. They are the one that leave a little cylinder of dirt on top of the lawn afterwards (Berger).



CONCLUSION

As our economy dwindles and our environment slowly degrades we wait for our political, economic, and technical leaders to help us out of our problems. Political leaders argue which economic policy is best while complex technological advances push to address environmental concerns on a large scale. Our culture has been guided towards uncontrolled growth, spending, and waste as a result of our prosperous history. We have definitely done our part to cause our current problems. So, Instead of waiting for our government or big business to save us, we can start doing our part today by modifying our cultural practices and attitudes. The landscape is everywhere. It is a critical part of everything we do. It is indoor as well as outdoor. It is literal and figurative. Landscape architects must guide our new culture to make a huge difference in the fight for our own well being. Evolution happens when a species has a common problem and members of that species have brilliant ideas, traits, or tendencies that create a positive change, improving the health, culture, and survival of that species future.

There are 7 billion people in the world (Population). If even half of us followed these tips, making small, simple, positive changes, the result could be about 3.5 billion more efficient people, which equals a huge difference for our planet. America has the 3rd highest population in the world. Together with the top two, China and India, we make up 42% of the world's people. We are the leaders of the world and we must create the example for the rest to follow. We can make a huge difference if we come together and just make a few small changes.

GLOSSARY

Anaerobic- Without air or oxygen.

Bioremediation- The use of either naturally occurring or deliberately introduced microorganisms or other forms of life to consume and break down environmental pollutants, in order to clean up a polluted site.

Carbon Footprint- The amount of carbon dioxide emitted due to the consumption of fossil fuels by a particular person, group, etc.

Carcinogenic- Substances capable of causing cancer in living tissue.

(Compact) Fluorescent Light- a light that contains a gas that produces invisible ultraviolet light (UV), when the gas is excited by electricity. The UV light hits the white coating inside the fluorescent bulb and the coating changes it into light you can see. Does not require much heat to operate.

Deciduous- A plant that sheds its leaves annually.

Ecology- The branch of biology that deals with the relations of organisms to one another and to their physical surroundings.

Efficiency- The ratio of the useful work performed in a process to the total energy expended.

Environment- The surroundings or conditions in which a person, animal, or plant lives or operates.

Eutrophication-excessive richness of nutrients in a lake or other body of water, frequently due to runoff from the land which causes a dense growth of plant life and death of animal life from lack of oxygen.

Evapotranspiration- The amount of water lost from plants due to evaporation and transpiration from the plant.

Evergreen- A plant that retains green leaves throughout the year.

Greenwashing- Disinformation disseminated by an organization so as to present an environmentally responsible public image.

Hardscape- The nonliving or man-made fixtures of a planned outdoor area

Incandescent Light- A light bulb that creates light by heating a filament inside the bulb; the heat makes the filament white-hot, producing the light.

Latent Energy- The existing but hidden or concealed energy required to produce something.

Municipal Waste- The garbage from a city or town

Nitrogen- A gas that makes up 78% of the earth's atmosphere.

Potable Water- Water that is safe to drink

Solar Radiation- Radiant energy emitted by the sun, particularly electromagnetic energy.

Sustainability- Conserving an ecological balance by avoiding depletion of natural resources.

Temperate Climate- A region or climate characterized by mild temperatures.

Transpiration- A plant or leaf giving off water vapor through the stomata

Urban Runoff- The draining away of water (or substances carried in it) from the surface of an area of land, a building or structure, etc.

Water Cycle- The cycle of processes by which water circulates between the earth's oceans, atmosphere, and land, involving precipitation as rain and snow, drainage into streams and rivers, and return to the atmosphere by evaporation and transpiration.

Watershed- An area or region drained by a river, river system, or other body of water.

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