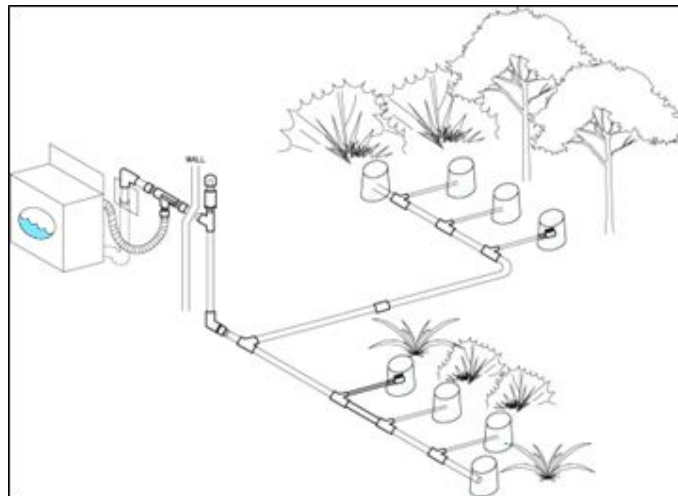


**Water Crisis of 2020: Final Report**  
Alternative Future Project  
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The 2030 technological vision is represented by the federal implementation of greywater reuse systems in suburban households. Severe droughts in California sparked technological configurations that helped make our lives become more sustainable, as they prove to be today. Another alternative to the Water Crisis of 2030 would have been desalinization techniques which would filter saltwater to be drinkable, but this technological fix would not have created the lifestyle changes necessary for those living through extreme droughts. Implementing new, more complex technologies would just alter the behaviors of society. What we wanted to happen was to also adjust people's attitudes, so the new and improved sociotechnical system of water would not result in drought yet again, and the relationship between technology and nature would not be as abusive.

The Water Crisis of 2030 sparked a three-pronged solution from our design team. A technological fix was necessary to alter the way people lived their lives in relation to water reuse. Social changes included eating less meat, growing home gardens, shopping organically, and ceasing the use of water for recreational reasons. Policy changes were implemented by the federal government, including the reshaping of the U.S. agriculture industry as well as mandating greywater systems for suburban homes in California.

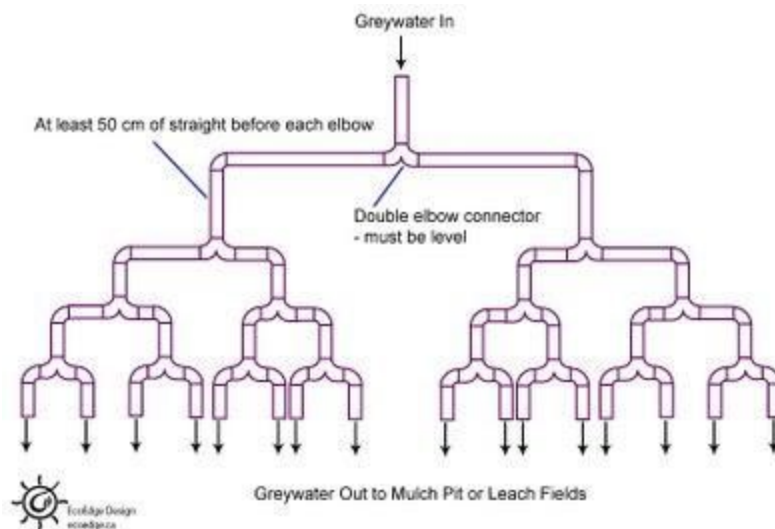


**Figure 1: Landry-to-Landscape Irrigation Technique (Greywater Action)**

Greywater systems collect gently used water from showers, sinks, and washing machines in suburban homes. The simplest way to reuse greywater for irrigation is to collect “warm-up” water (the water that is wasted when waiting for water to reach a certain temperature) and shower water in general in buckets. It is also possible to “bucket flush” toilets with the water collected from showers. By using natural shampoos and soaps (the only types of cleaning products now sold in stores), this greywater will contain less oils and chemical contaminants than cleaning products with high salt content. Used water from showers can be recycled through gravity-based pipe networks, which eliminates the need for a pump. Figure 2 is a schematic

representation of a pipe network example that outputs greywater into an irrigation setting. This can be on both large agriculture and home garden scales. This system is both cost-effective and simple for suburban homes. Drainage pipes can branch out to root zones of trees and plants, and requires minimal maintenance in the long run. Also, this eliminates the need for sprinkler systems to water lawns (Figure 1).

It is possible to collect water from washing machines through “laundry drums”; a system that pumps laundry water into storage to be used for irrigation. This is the cheapest and easiest system to install. Another “laundry-to- landscape” technique attaches the washing machine draining hose to an irrigation system. Water from kitchen sinks are high in grease due to the draining and washing of various foods; not all are allowed to be reused under many greywater codes (Greywater Action). Water filled with organic components can clog pipe systems. The organic matter that enters these systems, however, can be decomposed with the use of mulch basins.



**Figure 2:** Branched-Drain Gravity Pipe System (Barnes, 2008)

Implementing these greywater systems will result in efficient use of the scarce water supply of today. These systems are cost-effective and provide environmental benefits. Public buildings can create codes for these greywater systems as well, but this requires new construction and plumbing diversions.

To go along with new technologies being implemented to solve the global water crisis, changes to existing policy had to be made, along with enactment of many new policies to increase the efficiency of these systems. Greywater systems were phased in beginning in the early 2020's, and since then they have become mandatory in all households including those using even small amounts of water. All new building construction in the United States requires the installation of an appropriately sized greywater system for the building, with the most common systems being put in residential buildings. Some states have even implemented, with varying success, a “Toilet to Tap” program in which toilet water is fully filtered back into clean drinking water to be reused as tap water. Obviously, such programs face significant public concerns about the true cleanliness of the water. As a result of the widespread use of greywater

systems, the need for public sewer systems has been essentially eliminated. Therefore, the infrastructure that once supported those systems has begun to be taken apart.

With such drastic water shortages, the government has had to step in to impose policy changes regarding lifestyles. Time limits have been put on just about every activity involving the use of water. Showers are limited to a total of four minutes, laundry cycles have a limit to the volume of water that can be used, and strictly greywater can be used for agricultural/plant watering purposes. Only hospitals have escaped the more strict regulations on water use, due to the need for clean, fresh water for immediate emergency patient care.

It is important that the water that is drained into greywater systems is as clean as possible, so that its reuse is easier and more practical. In light of this fact, companies producing cleaners, shower products, and even liquid food products have had legislation imposed upon them that controls the chemicals and the amounts of chemicals that can be in their products. In essence, it has become necessary that anything washed down the drain is composed of more natural ingredients, and in particular, less salt.

To ensure we stay on top of these issues, significantly more funding has been channeled to the Environmental Protection Agency in recent years. With greater funding, they are able to conduct surveys, inspections, and more effectively regulate the use of water and ensure that it is not abused. The EPA now takes a much closer look at the overall environmental footprint of large corporations, as well as keeps tabs on averages for residential water users and small businesses.

Beyond changing the behavior of the United States through policy changes, there was a push for attitude change. The EPA launched a “Rethink Water” campaign to educate and promote a lifestyle change. The largest lifestyle change that stuck with the public and companies was moving to a vegetarian and vegan diet. By 2030 an estimated 65% of households consider themselves vegetarian. Even large supermarket powerhouses joined on board, creating a Meatless Monday pact between Safeway, Walmart, Trader Joe's, Whole Foods, and Costco where they all agreed to sell no meat products on the Monday. Many neighborhood grassroots groups also expanded on local community gardening to reduce the size of the agriculture industry, which had become very water intensive. Companies took the lead in changing society's paper usage by going completely electronic calling attention to the excessive amount of water needed to create paper products. Following businesses lead, consumers reduced their consumption of household paper use like paper towels and napkins. As part of the EPA education plan, K-12 schools were given funding for water awareness and environmental science education to continue to educate and change the attitude of the future society.

As California adapts to the freshwater crisis by creating new technological systems and shifts in habits, across the Pacific Ocean China has decided to elude change and exclusively use desalination techniques. In the beginning of the 20's desalination was working great for the Chinese. They were producing more than enough water to keep lifestyles the same as they were prior to the freshwater crisis. The edges of the entire coastline of China had turned into massive desalination plants, and has left the beaches to no longer be able to be visited. The plants emit giant plumes of pollution from the fossil fuels used to run the factories. Not only is the air on the coast being destroyed, but the winds off of the sea carry the factory plumes further into China.

China now, in 2030, is facing detrimental effects from depending solely on desalination methods. The first major problem with the desalination method is the amount of fossil fuels needed to run all of the factories. The reason why desalination works so well in the Middle East

is because their abundance of oil and their extreme lack of water sources and precipitation. For China though, they started to ship in more and more oil. Not only was the factory polluting the air, but do were all the tankers bringing the oil in for the factories. The pollution in the air and not only cause that problem, but creates acid train as well. Then with most desalination plants the salt extracted from the sea water just gets drained right back into the ocean. This will cause a drastic rise in the salinity of the water and most likely kill species that live close to the beach. China's inability to change with the problems has caused them to have even more problems and technological remediation cannot undo all the damage that has been done. Pipes taller than humans span across the country to bring water from the coast and out to the rural areas of China. The coast is perpetually covered in smog, even more so than it was in the 10's.

Damaging effects from technology are evident when they only provide behavioral changes in society. Complicated mechanical systems and processes don't have to be the answer to every problem we face. On a temporal scale, nature has survived for billions of years before human existence and is now becoming depleted due to the historic assumption of nature as a standing reserve.

We have to look mimic the resilience of nature to see how it independently fights back against human degradation. It is not the technology that had originally depleted freshwater in California, but human thought behind technology that made the drawing of water fast and easy (in turn, making our lives simpler). The technological relationship that humans have with water in 2030 is that conservation is the key to live sustainably in a world where natural resources are no longer readily available. The perception that clean drinking water is readily available for non-essential use is no more. The engineering behind greywater systems instead proves that the human-versus-nature mindset has shifted to one that promotes environmental value rather than the quick fix to the issue.

## Works Cited

Barnes, Douglas. "Greywater Guidelines." *Permaculture Reflections*. EcoEdge Design Ltd., 18 Nov. 2008. Web. 10 May 2016. < <https://www.permaculturereflections.com/greywater-guidelines/>>

"Greywater Reuse." *Greywater Action*. American Rain Catchment Systems Association. Web. 05 Apr. 2016. < <http://greywateraction.org/greywater-system-examples/>>