**Tidal 94: Water in the desert**

 **Mechanically powered by the gravitational pull of the moon and focused solar heat**, Tidal 94 separates seawater into fresh drinking water and crystallized sea salt. The localization of drinking water and salt production engages the public in the spectacle of infrastructure.

 Inspired by a water droplet and designed for efficiency, Tidal 94 represents a beautiful convergence of form and function. These **drops in the ocean** off the Santa Monica pier represent a revolution in water production. Clusters of drops could be built on any coastline, appropriately scaling up to LA County’s water needs. If enough drops fall, they **could flood Southern California with fresh water.**

 **Santa Monica is in a desert**. The water naturally available in this landscape could only support a small population of people. Any amount of water historically present in this landscape has been disrupted and polluted by human development. **There is no local water**.

 **LA County uses 535 million gallons of water per day.** This water is drawn from a 157 million acre watershed that sprawls across 8 states. This water is pumped over mountain ranges and across hundreds of miles in a series of massive water transporting pipelines to eventually reach the destination of Santa Monica. The energy required to deliver this water is around 900,000 MW per year, or about half the annual output of the Hoover Dam. Water extracted from these foreign sources comes at a cost to local ecosystems. Water tables drop, aquifers disappear, and habitats are destroyed. The infrastructure required to transport this water displaces wildlife and destroys ecosystems. The resources required—the concrete, the heavy machinery, the fossil fuel, and countless others—for this undertaking is unthinkable. With current technology, **this is necessary for a city in the desert**.

 **Tidal 94 will supply 100% of Santa Monica’s water using 0 watts of electricity.** Producing this water locally saves 18,000 Mega-watt hours per year in transportation alone; this figure does not include the colossal energy and resource requirements for construction and upkeep of this water delivery infrastructure. 2,000 tons of sea salt will be produced daily as a result of the desalinating process. **Santa Monica will be a water independent desert city.**

 Ocean water is an endless resource. We have the technology to create fresh drinking water from it. Presently, that technology is prohibitively energy intensive. The newly installed **Carlsbad Desalination plant uses 681 MWh per day**, and inflicts a myriad of damages to the surrounding ecosystems. This facility is more appropriately a backup generator, a fall back in case of emergency, but unrealistic for regular use. **We want to create a low impact, localized alternative.**

 **Tidal 94 produces 8,000,000 gallons of fresh drinking water every day.** The pipeline to Santa Monica city center is less than 1 mile. No electricity is required for the production of this drinking water. The fuel of our installation is infinite. **We tap into the orbiting energy of the moon and the thermonuclear reactions of the sun.** The moon pulls at the oceans as it perpetually circles the earth. The sun’s rays tirelessly shine as earth spins and orbits. These sources of raw power are reliable and endless.

**Tidal 94 harnesses these forces to create drinking water from the ocean.** The large floats rise and lower with the fluctuating tides, pumping seawater through our desalinating process. The tidal pump and cylinder system act as a large syringe; when the tide goes out and the floats drop, suction is created in the cylinders on the deck. This suction pulls water from the sub-sand seawater intake, which is buried in the sandy ocean bottom, away from the foundation of our structure. This water is drawn up and fills the cylinders until the tide slacks. As the tide comes in, pressure is created as the ocean pushes up on our large, buoyant floats. This immense pressure forces the water that has filled the cylinders through a Reverse Osmosis (R.O.) filtration system. The resulting fresh water is directed towards our storage tank, and the salty brine is further processed. **The force utilized in this system is slow, methodical, and incredibly powerful.**

 **One negative externality of modern desalination plants is the disposal of the high salt brine**. This brine is extremely disruptive to ecology, and if handled improperly can result in the destruction of ecosystems. The best disposal option, currently, is to find a powerful deep ocean current, construct pipeline infrastructure to reach it, and release the brine there. The hope is that the salt will be dissipated to the point that will not harm aquatic life. This seems optimistic at best, and if ecological calculations are incorrect, the results could be disastrous. The strategy relies on the outmoded ideology of “The solution to pollution is dilution.”

 **Rather than disposing of excess salt brine, Tidal 94 harvests sea salt from the ocean**. The salty brine that results from the reverse osmosis process is directed to the evaporation tents. The brine fills a large shallow dish on the bottom of the structure; these tents have a series of fresnel lenses that focus the suns’ rays throughout the day. This focused sun energy heats the brine and brings it to a boil, water vapor is released into the enclosed tent and salt is left in the dish. The water vapor condenses and collects, dripping towards the cooler collection area. The results of this process are fresh drinking water, and edible sea salt.

 **Tidal 94 is an extension of the axis created by Santa Monica Boulevard and the current pier.** The platforms are sized to supply specific neighborhoods of Santa Monica with their fresh drinking water needs. They each offer a different community-engaging function to include visitors from all walks of life. Views from the decks and water-level floats offer an experience unique to Santa Monica. Traditional industry is fenced off and distinctly separate from the cities they supply. By bringing water generation into the city and integrating it into daily life, people will come to understand the metrics of power and learn to gauge their own use. The modular system allows for further expansion on the county and even state level.

 Tidal 94 is a revolutionary way to create fresh drinking water with minimal environmental impacts. Local water production will reduce stress on regional ecosystems and eliminate expensive transportation. Production of sea salt takes a negative externality and turns it into a resource. The form and spectacle of infrastructure engages the public in localized water production. The reef habitat created by the structural supports will spark diverse ecological vitality. **Tidal 94 is our best option for a water independent future in the desert.**

**Environmental impact statement:**

**Santa Monica’s water is extracted from foreign sources, and comes at a cost to local ecosystems.** Water tables drop, aquifers disappear, and habitats are destroyed. The infrastructure currently required to transport water to Santa Monica displaces wildlife and destroys ecosystems. The resources: the concrete, the heavy machinery, the fossil fuel, and countless others required for this undertaking is unthinkable. With current technology,this is necessary for a city in the desert. **Our proposal supplies water 1 mile from the city center.**

 **The construction of Tidal 94 will directly lead to the creation of new habitat.** We will create a diverse artificial reef system using the structural supports of the platform. We will create a rough, rocky texture on the surface of the structure to offer larval corals a place to attach themselves. The orientation and design of this undulating reef creates pockets that are protected from the battering waves and tides. This allows plants and other life to take hold; these pioneer species lay the foundations for thriving ecosystems to develop. This vitality will attract larger fish and sea life, creating mediated fishing opportunities for pier visitors. These nodes will act as source habitats, allowing more stable populations of sea life to inhabit surrounding areas currently inadequate to support them. Even if there were no above water function to our project, **the creation of these habitats would justify construction.**

 **The sub-sand seawater intake protects sea life and habitat** by burying the water suction device in the sand. This prevents fish, larvae, and other life from being sucked into the system. This is positive from the perspective of both the fish, and the longevity of our filter membranes. The sandy sea floor does a great job of screening living organisms as well as other suspended particles before they enter our system.