

A Kelp forest established between the breakwater and the existing pier would increase biodiversity and in many ways counter the effects of the millions of people calling Santa Monica home along with the millions of tourists who visit the city every year.

Kelp provides homes for numerous animals such as sea urchins, starfish, jellyfish, crab, and anemones that then attract larger fish and start to establish a great and complex system of life in the area that will only help to draw more people to visit and coexist with the numerous animals in the water. The kelp would have an impact on the currents, which in the past were a problem for the pier and caused its destruction on numerous occasions. Not only would the kelp help, but so would new and improved breakwaters that would be implemented.



## Story of a wave

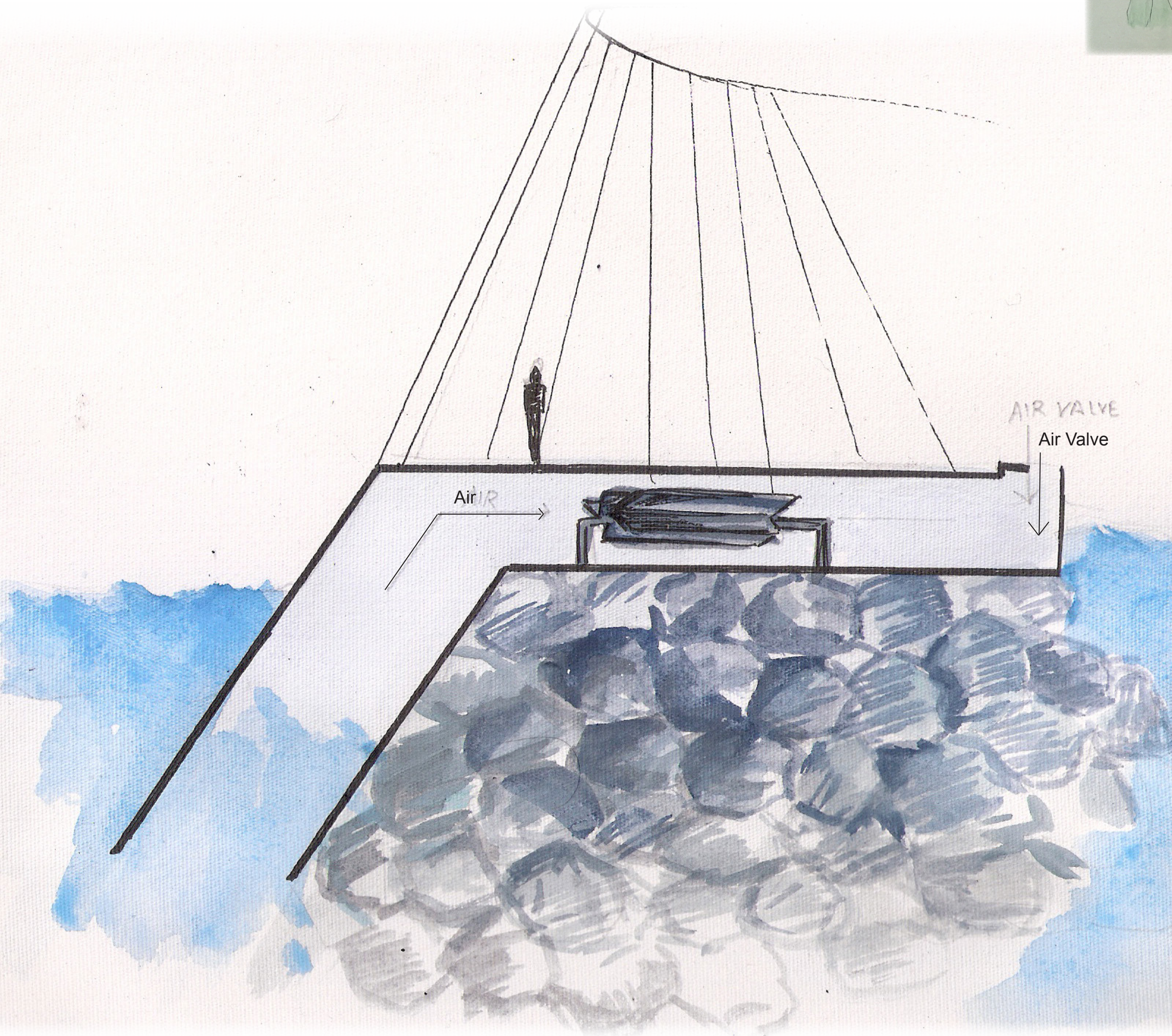
Waves, a phenomenal word that is used in our everyday lives from describing weather patterns on a climate report to explaining the changing numbers seen in demographics represented by waves. They come in all sizes representing different theories from microscopic vibrations seen in a tong to tremendous water waves seen in an ocean.

What makes this wave so unique and indigenous to the city of Santa Monica is that it is a narrative about its own history of wildlife, culture and water pollution. It is a story that needs to be heard by its inhabitants in order to create an atmosphere not only for the betterment of humans, but also for the rest of the flora and fauna that make the city a pleasant place to be at.

The city of Santa Monica, California is the second largest metropolitan city in the United States after New York. Being an excellent location to spot different types of wildlife in various habitats along with user-friendly and approachable transport options for its residence as well as tourists makes Santa Monica a growing city in terms of population. A multi-functional city that is so diverse can produce a large eco-footprint indirectly without realizing it. Although Santa Monica has seen a significant growth in economic development, environmental sustainability must always balance economics to have a healthy city.

If we recall the history of Santa Monica's water pollution level, we can see a distinct timeline set within the past hundred years set from 1900 to 2000. A hundred years ago the city was inhabited by various indigenous groups by the Tongva clan. As years passed by, development accelerated due to an increase in the number of people migrating to the city from 1945-1970 resulting in sediment run-off from industries and exploitation of water resource through the release of contaminants. 1985 was the time when the city became aware of rising pollution and thus steps were immediately taken to reduce water pollution. Thus the past 20 years have been the most sustainable years that the city has seen. If we plot a graph between time (in years) on the horizontal (x- axis) and level of sustainability on the vertical axis (y-axis) one can see a wave that is describing the environmental issue of the city through its years.

The "Story of a Wave" is a design that makes people aware of their surroundings and how one's lifestyle can have negative or positive impacts on the environments. Its dominant path that mimics the above graph that shows a relatively high point from the starting point of the existing pier which eventually dips down representing a lower level of sustainability. The dip is followed by a rise that eventually comes to a constant. The entire design of the path is constructed with glass



This system is dependent on the movement of tides that turns the turbine in order to generate the electricity. It is achieved by constructing a chamber that has one open side inside the ocean and the other above the ocean for airflow. The first chamber allows air to get compressed by the rising movement of tides that drives the turbine in one direction. Additionally, the latter chamber acts as an air valve that runs the chamber once the tide goes down. Thus the continuous and rhythmic movement of the tides makes the turbine move at all times without the use of an external generator.

With the chamber being laid out in a wave it is easy to capture different forces of waves from different locations producing energy. Now imagine a series of turbines placed inside the chamber producing electricity and powering up not only the site but also the city.

This sort of a system has been generated by VOITH Hydro and has been successful in producing up till 250kW and can supply up till 2000 households with clean renewable energy.

What is beneficial from this sort of an energy production source is the fact that it will produce continuous electricity without the emission of greenhouse gasses as the flow of tides is infinite and will never stop. Furthermore the entire construction has been set up in a way that acts as a breakwater preventing damage to its kelp forest, existing site and existing pier.