

Sea Level Rise Solutions for the Tuvalu Islands

Not too long ago the Tuvalu islands were practically unheard of. It wasn't until the effects of global warming and sea level rise were discussed that this little island nation was made known to the world. The Tuvalu islands are a group of islands located in the Pacific Ocean. Scientists are particularly concerned with this island nation because of its extreme vulnerability to sea level rise. The average elevation of the Tuvalu islands is just one meter, making it one of the most vulnerable countries to sea level rise. It has been estimated that within 50 years the sea will swallow the country of Tuvalu.

The people of Tuvalu have a fighting spirit but sea level rise is bringing big problems such as fresh water shortages, contaminations and waste management to the nation. Some external officials suggest moving the nation's population to a nearby country and letting the oceans cover the country. Instead of wasting such a precious nation the researchers of this group have come up with a plan that will benefit coastal regions all around the world thanks to the Tuvalu nation. The concept of this plan is to turn the Tuvalu islands into experimental land in order to investigate possible solutions to sea level rise.

The first stage of this process would be to offer voluntary immigration to the citizens of the nation. Since this nation has vehemently expressed that it will fight to see its nation survive sea level rise, it is expected that a substantial number of the country's residents will stay. The remaining residents will be divided into three experimental groups. Since the island nation is comprised of 9 islands 6 of the islands will be sacrificed as a control group. A group of researchers will live on a boat off the coast of these islands to survey the effects of sea level rise on these islands. The main study will be focused on three islands. Each island will be focused on a possible solution to sea level rise. The investigation will compare which method is best for keeping ocean water from invading land.

In the first island the inhabitants would focus on the construction of new homes and other buildings more inland. With that said, their design would have to be suited to areas with high probability of flooding. Therefore they can be built using support beams and other forms of architecture where the home or space being occupied is high off the ground. To add to this, something called sea cement could further support the structures. By using wire mesh submerged in seawater and a small electrical current, calcium carbonate and other minerals dissolved in the seawater will solidify onto the wire mesh. If the wires are wrapped around the support beams or whatever is keeping the space above sea level and a steady electrical current is passed through whenever there is flooding then sea cement could form. This form of cement is in fact stronger than real cement and more eco friendly. The cost of new construction would be fixed as well as the cost for the wire mesh. The only variable needed to be taken care of would be the cost of running the electrical current. Since flooding does not occur all the time, perhaps sensors could be installed that trigger the electric current whenever flooding is high enough to interact with the wires. Additionally, the electrical cost would not be very high

considering only a low voltage is needed for the calcium carbonate to solidify onto the wire.

The second island can determents the effectiveness of a concrete seawall. The construction of a wall could possibly solve the problem to sea level rising. It would be a massive and thick concrete wall surrounding the small island. Concrete would be used, because other friendlier materials would be easily warned down by the seawater. Concrete is longer lasting, stronger and would require less maintenance. The height would be approximately 10ft, but if adjustment is needed the height can be altered as time passes. This experiment will take place in Niulakita, the smallest Island and will cost approximately 20,000 dollars. Although the price estimate to building a wall surrounding an island would initially be high, the construction of the wall will only take place once. After that, the only worry would be a yearly cost for maintenance. This solution would solve the issue of flooding, and will keep the rising sea level away from the island; unfortunately this could affect the surrounding reef negatively.

In the third island a simpler solution to save the island from the potential threat that water has is placing rocks primary along the coastline. This will cause the islands coast to elevate and it will increase the elevation so the threat of the water will be less harsh. This solution is economical, ideally the rock for this solution would be coral. The corals ability to absorb water easily really helps the decrease the threat that can be presented in the future. The Tuvula island would have to import Corals from elsewhere in order to not disrupt the ecosystems. In the case that this island do become below sea level an aquifer pumping the water off the land could be considered. This would cost but it would increase the possibilities of saving the island from that point the aquifer would be a long term solution. Establishing the islands sea level will take time but ideally the pump would ultimately become a long term solution.

What we hope to accomplish with this experiment are meaningful results that will be vital for so many of the nations that will be affected with sea level rise. This project will provide hope for so many populous nations around the world that if no actions are taken will soon be covered by water. It is proposed that since this project is very high in cost an international sea level research fund should be established. Contributors to this fund should be all nations that will be affected by sea level rise. This is a long tem project that encourages nations to think of their future.