UNDERWATER CITIES

[Author’s note: I was featured on a BBC podcast called “Crowd Science,” which aired on August 18, 2018. The specific episode was entitled “Could Humans Live in Underwater Cities?” I had earlier submitted three program ideas, and this one was selected. I was interviewed in advance for about 35 minutes via Skype between my home and the BBC studios in London by producer Melanie Brown and presenter Marnie Chesterton. In the completed program, I can be heard in brief, edited clips at the beginning and the end of the 27-minute episode. What follows are the rest of my ideas which were unaired regarding the possibility and challenges of building underwater cities someday around the globe.]

I have always loved the water, be it in the form of lakes, streams, rivers, or oceans. Human life itself evolved from the seas; in fact, our bodies are still about 70% water, and our planet is often referred to as the Blue Planet because the Earth is only 30% landmass – the rest of course being water.

Throughout my life, I have enjoyed (and have even taught at youth summer camps) swimming, sailing, rowing, and canoeing. In college, I took courses in American Red Cross lifesaving and also became a certified PADI scuba diver. As anyone who has spent sufficient time underwater knows, the seas teem with incredible forms of life and tremendous seascapes of beauty -- especially in warm, tropical waters. I have dived or snorkeled in the Great Barrier Reef in Australia, the Florida Keys, the Gulf of Oman, the Galapagos Islands, the Bahamas, Baja Mexico, and Hawaii. I have also visited most major aquariums around the world. I have even ridden in a tourist submarine with my family off Lahaina in Maui, down to the depth of about 150 feet. As I write, our daughter, Jennifer, is even now working on her PhD in chemical oceanography at M.I.T.

But when it comes to truly comprehensive underwater exploration, much of our knowledge of the oceans is spotty and unsystematic. True, we have laid undersea communications cables, looked for treasure galleons loaded with sunken gold, discovered famous shipwrecks like the Titanic, and retrieved important archaeological artifacts from ancient ruins under the waves. We have done notable sea floor core sampling, used deep-sea submersibles to explore heat and gas vents where underwater tectonic plates have split apart, as well as doing other practical oceanographic researches into many varieties of sea life. But despite those activities, the National Oceanic and Atmospheric Administration (NOAA) reported in 2000 that only 5% of the world’s oceans and only 1% of the ocean floor have been observed, mapped, or explored. Given that the oceans drive our global weather (first via currents, then with clouds-winds-rains), regulate our seasonal global temperatures, provide us with vast quantities of food, possess enormous untapped and useful mineral wealth, and ultimately keep all living organisms on earth alive, I submit that we need to focus much more on the seas for increased knowledge, continuous experimentation, and lessons in sustainable development.

Like most people, the idea of travel in outer space to other planets fascinates me. There is a certain romantic allure – fed largely through imaginative and exciting science fiction writings -- about venturing boldly into the unknown and finding completely new worlds to conquer.

But I ultimately believe that we would be better served by putting our money and resources into understanding our own planet first. And the most unexplored and under-utilized parts of the Earth are, again, our oceans.

In comparison to space travel, ocean exploration is much less expensive, much safer, and simply much closer to where we already live. It's a natural choice.

Let’s examine the myriad hazards of outer space, an environment completely hostile to human life: Solar radiation and deadly cosmic rays. A vacuum with no air or water. Zero gravity, with its adverse effects on every body system. Intense extremes of heat and cold. Constant concern with one’s food supply. The danger of micrometeorites. Isolation from our familiar habitat and its related psychological challenges. Little if any alternatives should a dire emergency arise. Enormous travel times and distances.

And let’s not forget the incredible expense of such risky space ventures. Do the potential benefits really outweigh these many negatives?

In comparison, I believe that we need to focus instead on the oceans. Underwater cities could provide a haven in the event of an environmental land catastrophe (or the aftereffects of a thermonuclear war), the outbreak of a sudden unknown disease epidemic, or simply to accommodate the future predicted overpopulation of the world’s cities.

The prototype of such underwater cities could initially be constructed in the more temperate waters of five main zones: the Gulf of Mexico, the South China Sea, the Bay of Bengal, the Black Sea, and the Mediterranean Sea. Each of these locations could then readily assist their nearby population centers as more are built.

I can envision each domed underwater city as having a population of about 20,000 people. The clear top of the dome would be approximately fifty feet below the surface. (This would hence allow some sunlight to still be visible.) The city’s base would rest at a depth of around two-hundred feet. The city would be located about ten miles off shore. It would be connected to the land coast by a pressurized tunnel which would be used both as an emergency evacuation portal and as a supply conduit for obtaining those items that the city could not provide for itself.

The entire city would be pressurized to one atmosphere (i.e., sea level), and be comfortably climate controlled. Its energy needs would be provided by nearby attached solar and wind power tethers, as well as by electricity generated using the ocean’s own waves and currents.

Each domed city would have homes, schools, offices, stores, recreational facilities, a hospital, and streets for bicycles and non-polluting electric vehicles. Parks with grass and trees would add an attractive touch of familiar land-based nature. Hydroponic greenhouses would help provide both food and oxygen production. Other animal and plant foods would be harvested directly from the ocean. Fresh water would be made available through desalination. Human wastes would be treated, then recycled for fertilizer. Using technology already being utilized on the International Space Station, the dome’s air would have its carbon dioxide regularly scrubbed clean and some of its water would also be recycled.

The inhabitants would live underwater for a five month period, then be rotated for one month back on ‘terra firma’ on a year-round basis. Employment would be in the non-polluting service industries, the laboratories of scientific and medical research, and in computer technology. The immense dome would also be equipped with regularly-spaced entrance and exit locks for both scuba divers and small submarine docking.

Jules Verne and Jacques Yves Cousteau would surely both feel welcome in such an intriguing aqua-environment! The world’s oceanographers, engineers, and other scientists would be vigorously put into action. Plus, new technologies are constantly being developed to help make this vision a reality. Initial funding could be shifted from some of our governmental space explorations to help finance these underwater city ventures, along with private corporate investments. Hopefully --perhaps fifty years from now -- we will finally attempt this bold new kind of living adventure, this time under the sea…

THE END

by Jack Karolewski

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