Way back in 1977—the year *Star Wars* came out, British Airways launched Concorde SST service between London and New York, and Jimmy Carter signed legislation creating the Department of Energy—NASA published an exceptionally forward-looking report called “The Role of Aerospace Technology in Agriculture” (https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19770026636.pdf).” Its purpose was to figure out how to feed a ballooning world population given the Earth’s limited resources—using space-
age technology. Oddly enough, amid high-minded discussions about the aerial application of chemicals and remote-sensing systems, was tucked this suggestion: Perhaps humans could subsist wholly—or partially—on a diet of krill.

The succinct proposal clearly fell to the wayside and remained buried in the NASA report until we happened upon it recently. It got us thinking: What if we humans had actually embraced this notion back in the day and had become a race of krill-eating beings? Was this forgotten report from the 70s a viable proposal for saving the future of mankind?

Krill, of course, are the tiny, shrimp-like crustaceans that are found near the rock bottom of the food chain. They feed on phytoplankton and—because they are protein-rich—are a primary food source for larger fish, which eventually get eaten by us. Although some nations certainly do make use of krill as a food stuff—the Japanese call it okiami, and Norwegians eat krill paste with crackers—in most of the world, krill is just used as fish feed in aquaculture. Vitamins are also made with their oil, and certain enzymes found in krill are used in various food and medical products. However, not eating them is understandable, too—krill are quite salty, and each crustacean’s hard exoskeleton must be removed before being eaten because it contains fluorine, which is toxic in high enough concentrations. But still, if humankind’s sustainability problems could be saved by krill, maybe we should figure out a way to use them as sustenance. Who needs Soylent or crickets if the oceans are filled to the brim with underutilized krill, right?

Evidently not.

As it turns out, the harvesting of Antarctic krill has greatly increased since the report was published, and conservationists are now increasingly concerned about its diminishing global supply. Not only do countless fisheries rely on Antarctic krill as feed, but demand for krill oil and its enzymes has skyrocketed. “It is well-known that many proposals in the 1970s were made to greatly increase food production from the sea—including harvesting krill and other zooplankton,” explains Boris Worm, a marine research ecologist and associate professor at Dalhousie University. “At the time, it was still thought that the sea could feed a rapidly growing human population, but by the 1990s, it became clear that wild fisheries could not be increased any more.”
In fact, by as early as 1982, an international convention had established The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) with the purpose of conserving Antarctic marine life. This came in response to increasing commercial interest in Antarctic krill resources and a history of overfishing in the Southern Ocean. As Claire Christian, the acting executive director for the Antarctic and Southern Ocean Coalition, explained, “CCAMLR has embedded in its treaty a precautionary, ecosystem-based approach. This essentially means that the krill catch is not going to dramatically increase beyond current levels unless scientists are sure that it won’t harm the ecosystem or the krill population.” China is now a signatory. Today, international quotas keep krill harvesting in check, although the quota was raised in 2014 to 300,000 tons.

Krill turned out to be so essential to the oceanic ecosystem, in fact, that the CCAMLR is still at work trying to establish ongoing guidelines to ensure its sustainability. Christian said, “Krill are fished in a relatively small area in the Antarctic Peninsula region that is very close to where penguins, whales, and seals are also foraging for krill. Sometimes krill fishing occurs adjacent to penguin colonies. This increases the risk that krill fishing will have negative ecosystem impacts. CCAMLR is very aware of the potential for overlap between predators and fishing, and is currently trying to establish more detailed management rules to prevent damaging these vibrant marine food webs.”

Although the NASA report’s authors seem to have wholly underestimated the importance of krill to the ecosystem and the rate at which Antarctic krill would be harvested in the 39 years following its publication, they most definitely understood that cultural norms and the widespread perception of krill would be an extreme roadblock.

Krill is now being used for oil and in vitamins because it is rich in omega-3 fatty acids, but the typical American is not going to chow down on a krill burger. As Manuel Barange, the director of the fisheries and aquaculture policy and resources division for the UN’s Food and Agriculture Organization, told MUNCHIES: “Increasing the catches of Antarctic krill to supplement human protein consumption would not necessarily replace fish consumption, firstly because people do not buy ‘protein’ but specific fish species they like to eat.”
Would it be possible to sell the public on krill? “In order for krill to replace fish in diets, you would need a global campaign to convince people that krill and chips is better than fish and chips.” Not an easy task, in Barange’s opinion. “We already see that climate change is expanding the distribution of some fish species into colder habitats, like anchovy into the North Sea, but consumption by humans does not always follow. People like to eat what they know.”

Christian agrees that krill is unlikely to be seen on McDonald’s menus anytime soon. “American taste in fish and seafood is pretty unadventurous. Americans in recent years have, for example, developed a taste for sushi and Southeast Asian cuisines like Thai and Vietnamese that use fish sauce, but even now I don’t think most Americans would be excited about putting krill paste on their crackers or eating handfuls of dried krill,” she said.

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Then there’s global warming. All the experts we spoke with agree that global warming will undoubtedly affect krill populations. As Christian put it, “Most scientists predict that if current trends continue, we’ll see significant decreases in their populations in the coming decades. So regardless of what crazy schemes people come up with to try to get people to eat krill, it may no longer be feasible to increase catch limits by even moderate amounts.”

Meanwhile, no specialist we reached out to had even heard of NASA’s obscure proposal. When we asked Boris Worm whether anyone would still propose krill as a viable solution to feeding the world, he said, “Absolutely not. There has been a lot of discussion, and it is simply not a good idea to take a large proportion of the basic food out of the ocean, that so many other species depend on. This is true both for small ‘forage’ fish, as well as krill and other plankton.”

He added, that the idea, if implemented in the 70s, would not have turned out well: “This would have had severe impacts on already compromised ecosystems in Antarctica and other places, and interfered most likely with the recovery of marine mammals from previous depletion.” Whales, seals, birds, and fish would have suffered.
Logistics and feasibility aside, we wanted to get a better understanding of how this report was viewed internally at NASA and if any parts of it, krill or otherwise, were actually put into use. To that end, we reached out to Steve Cole at NASA’s office of communications. Cole informed us that he “[hadn’t] been able to find anyone currently at NASA familiar with this 1977 research or actively involved in this type of work now.” Seems like NASA has resoundingly moved on from its krill-centric dreams.

Is there an easy solution to feeding the world in a sustainable way? Worm says no: “There is not any one solution, but a range of solutions that are interlocking. These include avoiding food wastage, reducing protein over-consumption in industrialized countries—most people consume more protein than they require and simply excrete it. A colleague of mine called it this: pissing away the world’s biodiversity.”

Perhaps we need to put our krill dreams to rest.

Christian says, “Humans are always looking for fast-and-easy solutions, but rarely do they turn out to be the bonanzas that were predicted. We already produce enough food to feed everyone on the planet, but millions still go hungry. We don’t have a supply problem. Instead of looking for the El Dorado of food sources, we should address problems in the current system. Otherwise, no matter what we do or what innovations we come up with, people will still go hungry.”

So much for a futuristic solution to world hunger, straight from the bottom of the food chain.

Every day this week, MUNCHIES is exploring the future of food on planet Earth, from lab-grown meat and biohacking to GMOs and the precarious state of our oceans. Find out more here (https://munchies.vice.com/en/show/the-future-of-food).

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