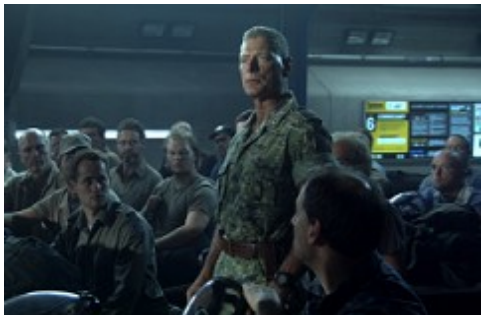
Sea Otters And Why They're ~~So Cute~~ Critical To Saving The Kelp Forests

by Matt Boddy

California kelp forests are in freefall. They've declined by 93% since 2013.

They're not the first, not by a longshot. The giant kelp forests of east Australia and Tasmania have been chewed down to the seabed. Climate change gradually dropped the water by three degrees Fahrenheit. Kelp favors cool water, and wilted in the warmer conditions; meanwhile warm water urchin species moved in and finished off the giant kelp forests in the region. The sugar kelp forests of southern Scandinavia are in decline. Japan's kelp forests suffered this fate eighty years ago.

These former kelp forests have been ground down into a new stable biome called urchin barrens, desert-like biomes covered in a carpet of sea urchins. Sea urchins are the cockroaches of the invertebrate world in that they're extraordinarily resilient, almost impossible to starve to death, and as food becomes more scarce, their bodies adapt to chew through calcified algae and barnacles.



"They are very hard to kill."

To thrive, kelp needs a rocky bottom to grow from, moderate salinity, and cold, clear, nutrient-rich water. They grow incredibly fast, half a meter per day, and are vital to all species in the ecosystem. Kelp forests are a nursery habitat for fry, and larger fish and seabirds depend on that. The dying kelp forest has devastated the local seabird population, with chicks dying of starvation at rates of up to 80-90% in some species. Seals and whale calves shelter in them from predators (sharks and orcas, respectively), and seals hunt for fish in them. Other shellfish like red urchins and abalone also feed in the forest. What's happening right now is a perfect, terrible example of how a single change to an ecosystem can be like pulling the ace out of a house of cards.

That's bad, because kelp forests turn over an amount of carbon dioxide that puts them on par with rainforests in terms of oxygen generation. They stabilize the coast by preventing erosion and they fight ocean acidification. So the death of the kelp forests affects all local species, humans included.

So how did California join this lousy fraternity?

The cause in fact – the big picture answer – is climate change. As previously mentioned, kelp favors cool, nutrient-rich water. Warm, nutrient-poor water, the kind of seawater that results directly from climate change, slows kelp's growth and reproduction and leaves it

vulnerable to ecosystem collapse. Add onto this that the ocean is a giant heat sink (one we've nearly used up) and the resulting ecological disaster was always just a matter of time.

The proximate cause is that in 2013, the purple urchin's primary predator, the sunflower sea star, was stricken with a wasting plague, which is great if you're a purple urchin and horrible if you're literally anyone else. The result was a textbook example of trophic cascade, a situation where a predator species declines and its prey species explodes. Next year, the coast was struck with a marine heat wave that lasted from 2014 to 2016, and the kelp started to wilt without the rich, cold upflow to support it. Then the wilting kelp got hit by the newly-bolstered purple urchin army. They're devouring the forest, out-competing other native species like red urchins and abalone. Divers report purple urchin numbers that are sixty to a hundred times what they should be.

The heat wave is over (for the moment), but the kelp forests can't get their traction again. It takes much fewer purple urchins to maintain urchin barrens than it does to turn kelp forests into urchin barrens – in other words, urchin barrens are highly resistant to change. We're in the early stages of ecosystem collapse.

Apparently the apocalypse looks like a purple hedgehog.

And the solution is...?

Fortunately, there is an answer for this: sea otters. The otters eat the urchins that prey on the kelp (and I mean they hammer them), and in turn the kelp provides shelter for the sea otters.

Some kelp forests aren't just doing well, they're gaining ground. On the west side of Vancouver Island, the kelp forest is spreading. In Vancouver, the sea otter population is increasing, and all those new fish-eating fuzzballs love sea urchins so much that it's creating a buffer for kelp to not just breathe but actually spread. And while kelp forests hurt in California, kelp forests in central California are thriving on account of the population of sea otters.

Canadians: leaders in eco-friendliness and regular friendliness

Sea otters have been making a steady comeback, but they came close to curtains in the 19th century. Sea otters have the highest hair density of any mammal. Where humans have 700 hairs per square inch, sea otters have anywhere from 170,000 to 1 million. This beautiful aesthetic has a purpose; where seals have blubber to warm them against the cold marine environment, sea otters have this incredible thick fur. It's so thick that mother otters can keep their babies afloat by breathing hot air into their baby's fur, making a life vest.

On the other hand, this fur coat for otters also makes gorgeous fur coats for humans, a practice that all but annihilated the sea otter population, down to the tune of only two thousand individuals. Intentional conservation efforts rescued the species from the brink, including:

- The International Fur Seal Treaty of 1911
- The Marine Mammal Protection Act of 1972
- The Endangered Species Act of 1973

Sea otters continue to recover, but remain far short of their historic numbers before their encounter with manifest destiny.

Continued threats

Ecosystem collapse reinforces itself. Sea otters themselves are not immune to the dangers of a dying kelp forest. They're symbiotes, with the otters eating the urchins, and the kelp providing shelter from sharks. Like killer whales, great whites can enter kelp forests if they must, but they avoid it. Otters aren't a meaningful food source for great whites; the sharks bite them to find out what they are, and instead of getting a juicy pinniped, they get a crunchy furball that they immediately let go. All well and good for the shark, but this exploratory bite is likely fatal to a 60-pound sea otter.

OH NO

Now that California kelp forests have been decimated in recent years, shark attack is the leading cause of mortality for sea otters on the California coast, from 12% in 1985-2000 to 21% in 2001-2010. This dynamic has turned into a vicious feedback loop: the kelp forests decline, which means the sharks kill more otters, which means that the kelp forests are more vulnerable to urchins and die off in even larger numbers, which means that sea otters are left exposed in the open and fall prey to even more sharks...what this means is that the sea otters and the kelp forests are both in trouble, and trouble for one means trouble for the other.

This may incline a reader to think of urchins and great whites as pests. That's not the case at all. Both are species in an ecosystem that – like all ecosystems – is stabilized by species pushing against each other. When one of those species becomes too strong or too weak, the ecosystem destabilizes. Urchins aren't to blame and neither are great whites.

The blame for the destruction of the kelp forest falls on humankind. Hunting sea otters, a cornerstone species, to near-extinction exacerbated what climate change has done to our kelp forests. The kelp forests are dying.

Now, mostly dead is slightly alive.

How can I help?

Even now, in the eleventh hour, we can put a stop to this, but our efforts have to be intentional and active. Kelp forests and sea otters need each other; just as trouble for one means trouble for the other, help for one means help for the other.

Support climate change legislation and reform. This is the big one. Climate change is the great issue of our time, and will be the great issue of our great-grandchildren's time. Kelp doesn't like warm water, and climate change is warming the oceans. Developing clean energy is the highest priority. The kelp forests – most biomes, actually – are counting on us taking a u-turn, and I do mean right now.

- You're not off the hook, either. It's not just up to the overlords of industry and commerce to mend their ways. A big silver lining in the coronavirus epidemic is that it's lowered air pollution dramatically , and now that people have gotten a taste for working remotely, that change could become semi-permanent. Eat less meat (beef is especially detrimental to the environment), eat less chocolate (which is largely produced in deforested rainforests), and eat produce that's local and in-season (much less fuel to get it to you). We could write an entire article on how to reduce your carbon footprint.

Support the protection of the sea otter. Sharks aren't the only species that directly threaten sea otters; humans do a number on them, too. Interactions with fisheries, gunshot wounds, boat trauma, and chemical pollution remain significant causes of sea otter mortality. Supporting measures to fight seawater pollution and phasing out gillnets can only help.

Support the culling of the purple urchin. For a while, certain areas approved emergency culls on the purple urchin species, raising the limit from 35 individuals to 20 gallons (that's a lot of uni). Some areas even approved straight-up smashing them with a hammer, right there on the seabed. Dive clubs and naturalists signed up to help remove purple urchins from the barrens to help kelp get some traction.

Support the creation of a commercial market for purple urchin. The larger red urchins are what supply the uni to most sushi restaurants. Marine labs are experimenting with putting reclaimed purple urchins in tanks and fattening them up with feed, possibly make it a lucrative pursuit. If you want to get decision makers on your team, their bottom line is the best place to start.

This may sound weird, but…don't flush kitty litter down the toilet, not even litter that markets itself as flushable; sea otters can get toxoplasmosis from your cat. This protozoal parasite can lead to brain infections in otters. This problem is relatively prevalent right here in the Monterey Bay area. This writer has a surfer buddy who has related stories of seeing otters with these brain infections having violent seizures. So yeah, kitty litter goes in the trash.