What is the Tragedy of the Commons?

https://earth.org/what-is-tragedy-of-the-commons/

Tragedy of the Commons is an economic problem where individuals have access to a shared resource and act in their own interest, at the expense of other individuals. This can result in overconsumption, underinvestment, and depletion of resources.

Garrett Hardin, an evolutionary biologist, wrote a paper called "The Tragedy of the Commons" in the journal Science in 1968. The paper addressed the growing concern of overpopulation, and Hardin used an example of sheep grazing land when describing the adverse effects of overpopulation. In the example, grazing lands held as private property will see their use limited by the prudence of the land holder in order to preserve the value of the land and health of the herd. Grazing lands held in common will become over-saturated with livestock because the food the animals consume is shared among all herdsmen.

Hardin argues that individual short-term interest– to take as much of a resource as possible- is in opposition to societal good. If everyone was to act on this individual interest, the situation would worsen for society as a whole- demand for a shared resource would overshadow the supply, and the resource would eventually become entirely unavailable.

Conversely, exercising restraint would yield benefits for all in the long-term, as the shared resource would remain available.

Tragedy of the Commons Examples:
Arguably the best examples of this phenomenon occur in situations that lead to environmental degradation.

Among many things, pollution is caused by wastewater. As the number of households and companies increase and dump their waste into the water, the water loses its ability to clean itself. This results in water that is toxic to wildlife and the people that live around and rely on it.

Overfishing

Another example of the Tragedy of the Commons lies in overfishing. In Canada, the Grand Banks fishery off the coast of Newfoundland was a means of livelihood for regional fishermen. Abundant in cod, the fishery allowed fishermen to catch as many cod as they desired without negatively impacting their population.

Then, in the 1960s, advancements in technology allowed fishermen to catch vast quantities of cod, far more than before. However, with each passing season, the amount of cod deteriorated and by the 1990s, the fishing industry in the region collapsed because there wasn't enough fish to go around. This situation where individual fishermen took advantage of opportunities to benefit themselves in the short term, even when their actions were clearly detrimental to society in the long term, encapsulates the self-preserving mindset behind the Tragedy of the Commons. These fishermen thought logically, but not collectively, which led to their downfall.

COVID-19

The Tragedy of the Commons can also be applied to the COVID-19 pandemic. In its early days, people were generally wary of mixing with anyone outside their immediate family, leaving their homes less and working from home. However, another result of the pandemic was that people began to stock up on food and utilities. People likely assumed that everyone else would stock up as well and so the only solution was to preempt this scenario and stockpile food before the next person could. Again, people were thinking logically, but not collectively, and herein lies the relevance of the Tragedy of the Commons. Individuals took advantage of opportunities that benefited themselves, but spread out the harmful effects of their consumption across society.

Retailers responded by imposing restrictions on the number of items one could buy, but it was too late. Entire grocery aisles were empty, wiped clean.

Fish Harvesting Methods

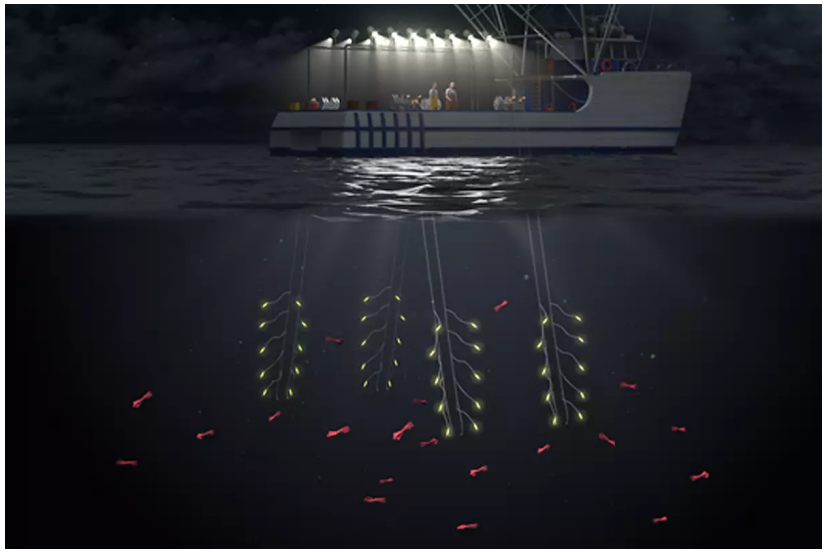
Fishermen use a wide range of gear to land their catch. Every type has its own effects on the ocean. By selecting the right gear for the right job, the fishing industry can help minimize its impact on the environment. https://www.seafoodwatch.org/seafood-basics/fishing-and-farming-methods

Beach and boat seines Seines are long nets, with long ropes on each end, which herd fish when dragged or towed. They're hauled over sandy or muddy bottom habitat, and the cloud of sediment helps herd the fish into the net. Seines are suspended vertically in the water with floats and weights, and some have a bag for catching fish. Beach seines are hauled in from the shore and are used to catch species like Atlantic croaker, Florida pompano and striped mullet. As the name implies, boat seines haul the catch onto the vessel. Danish seines, also known as "anchor seines," are a type of boat seine. The catch of unwanted species can be an issue in these fisheries.	
Bottom trawls Bottom trawls are cone-shaped nets that are pulled along the seafloor by one or two boats to catch cod, halibut, lobster, rockfish, shrimp and other bottom-dwellers. The variety and amount of non-targeted ocean life that's caught in many bottom trawl fisheries is a pervasive problem, and the heavy gear can damage sensitive seafloor habitat. Reducing the harmful effects of bottom trawling requires limiting when and where trawling can occur and gear modifications that allow unwanted marine life to escape and lessen impacts on the seafloor.	

Dredges Dredges are metal-framed baskets that are dragged across the seafloor to collect clams, cockles, mussels, oysters, scallops and sea cucumbers. Towed dredges scrape or dig into the substrate with rakes or teeth to about a foot in depth. Mechanized dredges are used to dig and wash out mussels that have buried into the seabed. There are also hand-held dredges. This fishing method can have significant impacts on sensitive seafloor habitat and bottom-dwelling species. One way to limit these harmful effects is to limit the areas where dredging can occur.	
Gillnets Gillnets are walls of stationary or drifting netting that are almost invisible to fish, so species like cod, perch, salmon, sardines and trout swim right into them. Set, drift and trammel gillnets use different configurations of floats and weights to suspend the netting more or less vertically. Encircling gillnets are set in shallow waters, and noise or another means is used to entangle the fish in the netting. Fix gillnets are stretched between two or more stakes that are driven into the seabed in the intertidal zone. Gillnets can accidentally catch vulnerable ocean animals like sea turtles, marine mammals and sharks. These impacts can be reduced by setting the gillnets deeper in the water column to allow room for animals to swim over and adding gear like pingers, which warn passing marine mammals.	

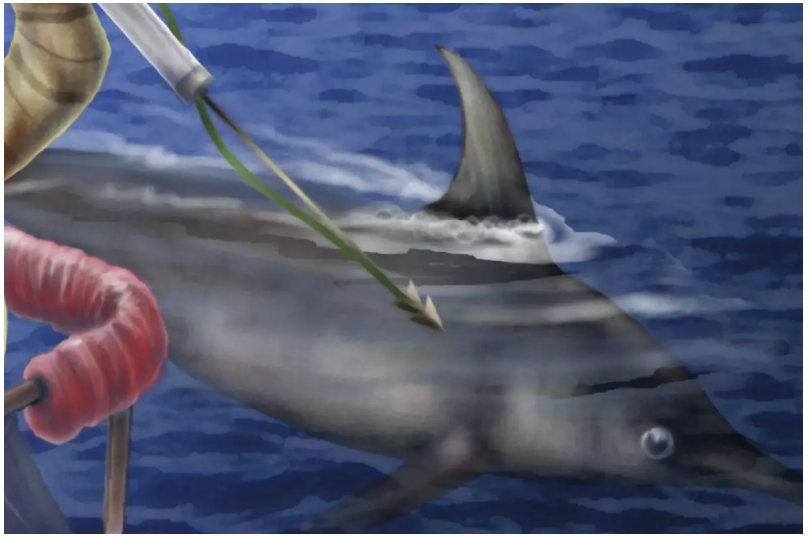
Handlines and jigs

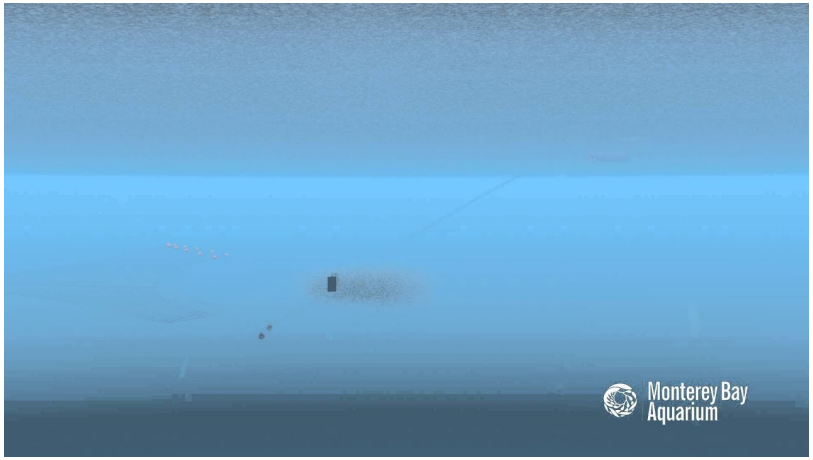
Handlines are used to catch high-value tuna and other species. This gear is operated from small boats and consists of a single fishing line with a baited hook. While wearing gloves, fishermen haul the line in hand-over-hand. A jig is a type of grapnel (or grappling hook), which is attached to a fishing line. Jigging involves manually or mechanically moving the jig in the water to lure prey, and then quickly pulling or jerking the line to hook fish. Jigging for squid is usually done at night with lights to entice them closer to the surface. These hand-held fishing methods are considered environmentally responsible because there's virtually no catch of unwanted marine life or habitat impacts.

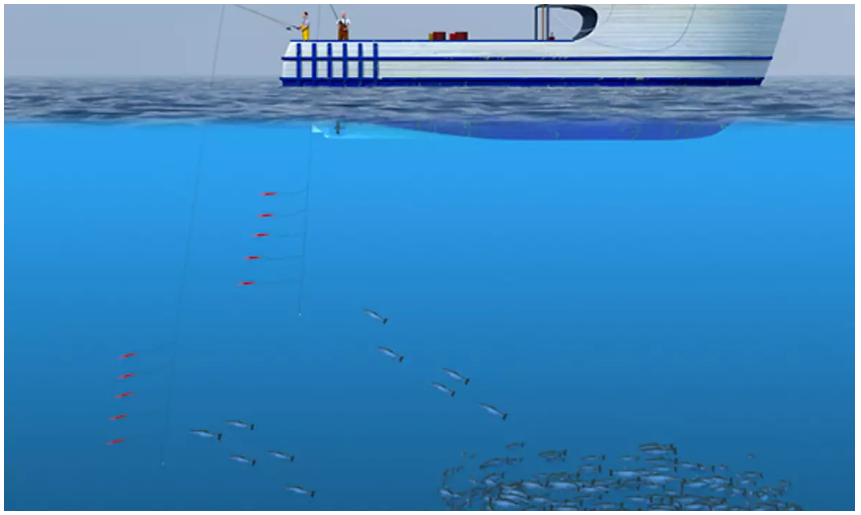


Harpoons

Harpoons are poles that have a steel point with one or more barbs at the end and usually a retrieving line. When a fisherman targets a fish, he thrusts or shoots the harpoon into the animal and hauls it aboard. This traditional fishing method is still used today by skilled anglers to catch pelagic predators such as bluefin tuna and swordfish. Modern harpoons are shot by guns. Bycatch of unwanted marine life is not a concern because the species and size of the fish are identified before it's caught.



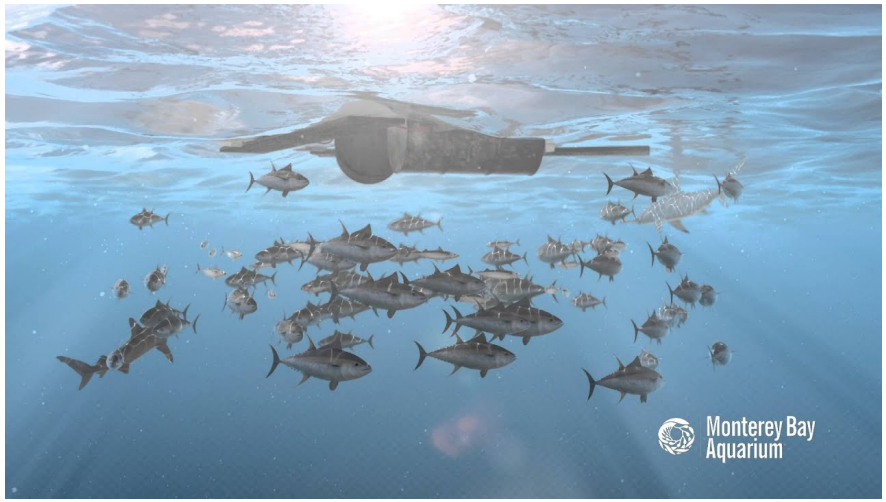
Longlines Longlines consist of a mainline that's supported by floats and evenly spaced branch lines with baited hooks. The length of longlines can be many miles long and depends on the vessel size and the crew's capacity to haul-in and store the gear and catch. Many species are caught with longlines. Drifting longlines are used near the surface to catch pelagic fish like tuna and swordfish, and set longlines are laid on or near the seafloor to catch bottom-dwellers like cod and halibut. A variety of species, including endangered sea turtles, seabirds, marine mammals and sharks, are also attracted to the bait. The accidental capture of some of these ocean animals can be reduced by setting drifting longlines deeper to allow many animals to swim over the top and adding streamers above the water to scare away seabirds. Also, a specially designed fishing hook called a circle hook can make it easier to release an animal that's been accidentally caught.	
Midwater trawls Midwater trawls are cone-shaped nets that are pulled along in the midwater zone to catch species such as anchovies, pollock and sardines. The net's horizontal opening is supported by boards or by pair trawling, meaning the net is towed by two boats. Midwater trawlers pull gigantic nets capable of catching an entire school of fish. This gear doesn't contact the seafloor when it's used in the midwater zone, but the catch of at-risk species occurs in many fisheries. Using streamer lines to scare away seabirds and avoiding areas with an abundance of marine mammals can reduce the amount of bycatch in these fisheries.	

Pole-and-lines Pole-and-lines are poles with a single line, hook and bait that are used to catch a variety of fish ranging from open-ocean swimmers like tuna to bottom-dwellers like cod. They can be hand-operated or mechanized when operating in deep waters. Pole-and-line gears have very low catch of unwanted marine life because fishermen catch one fish at a time and they can release unwanted species.	
Pots Pots are cages or baskets that hold species such as lobsters, crabs and Pacific cod alive until fishermen return to haul in the catch. Pots have one or more openings and are used with or without bait. The second opening allows fish or species that are below the legal catch size to escape. They're usually placed on the seafloor, but some are designed to be in midwater. While unwanted species can be released alive and habitat impacts tend to be minimal, the entanglement of whales and other species is a serious conservation concern in some pot fisheries. Also, ghost fishing occurs when lost or abandoned pots continue to capture fish.	

Purse seines

Purse seines use a large wall of netting to encircle schools of fish. Fishermen pull the bottom of the netting closed — like a drawstring purse — to herd fish into the center. This method is used to catch schooling fish, such as sardines, or species that gather to spawn, such as squid. Floating object purse seines use natural or artificial fish aggregating devices, or FADs, to attract schools of tuna. Dolphin set purse seine vessels seek out the dolphins that are associated with the tuna species they're targeting. Unassociated purse seines, also known as "free school" purse seines, target tuna schools without using FADs.

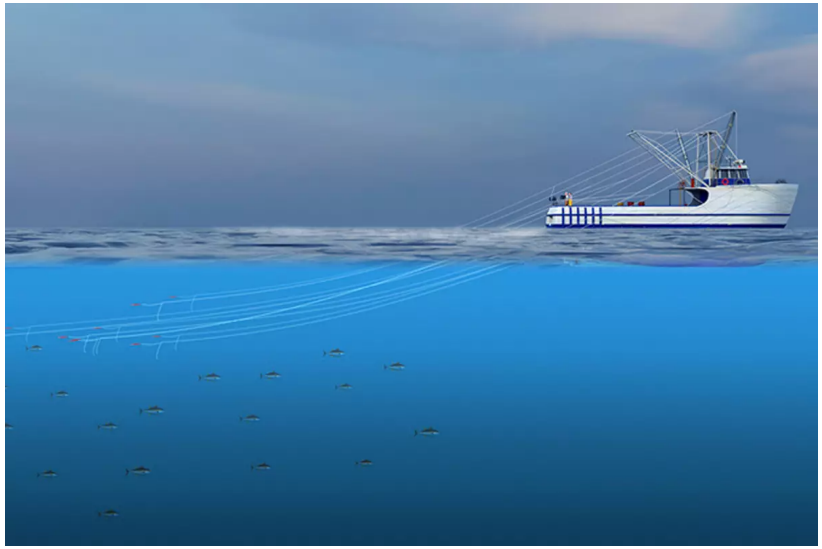
When purse seiners use FADs, the accidental catch of juvenile fish, sharks and other vulnerable marine life can be a serious conservation concern. These impacts can be reduced by decreasing FAD use, using biodegradable or non-entangling FADs and improving management and data collection.



Trolling lines

Trolling lines lure fish with moving fishing lines with baited hooks. Several trolling lines are often towed at the same time, and equipment called outriggers keep the lines away from the boat's wake. The lines are hauled in by hand or mechanically using small winches. Trolling lines are used to catch a variety of species such as mackerel, rockfish, salmon and tuna.

This fishing method has low catch of unwanted marine life. Fishermen can quickly release unwanted species since the lines are reeled in soon after fish take the bait.



Farming methods

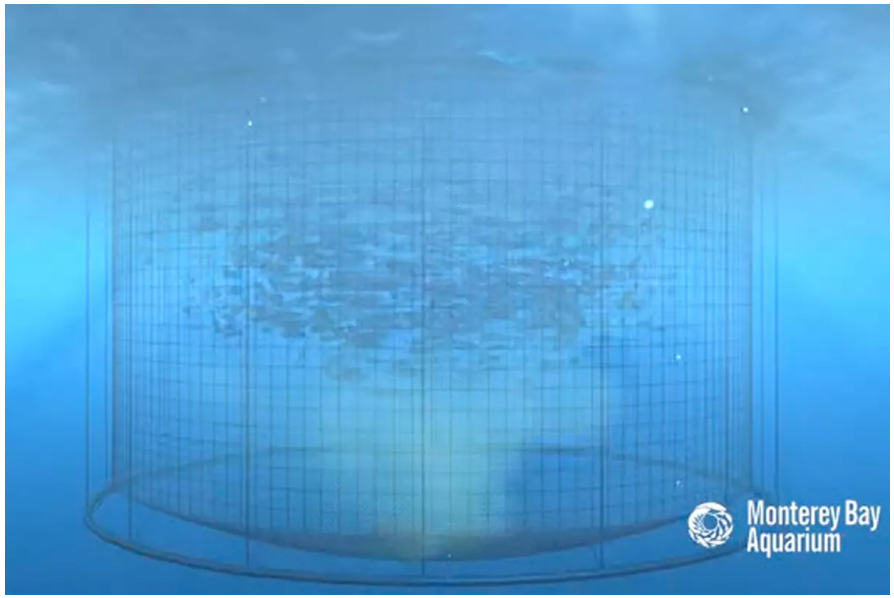
In the next decade, the majority of fish we eat will be farm-raised, not wild. Over 100 marine and freshwater species are farmed today using methods from traditional earthen ponds to high-tech tank systems. Each farming system has its own distinct environmental footprint. By choosing seafood from better farms and production systems, you can play a positive role in reducing aquaculture's potential negative impacts.

Bottom culture

Bottom culture involves growing shellfish such as clams, mussels and oysters on the seabed. Types include enclosed bottom culture where the shellfish are inside or under a net or other containment structure. When shellfish are cultivated using open bottom culture, they're not confined or covered in any way. After an appropriate growth period, the shellfish are harvested by hand, rakes or dredging. Seaweed may also be grown by bottom culture.

Off-bottom culture

Off-bottom culture involves growing shellfish such as clams, mussels and oysters in ways where they don't touch the ocean floor. Types include bag culture where shellfish are grown in mesh bags on stands in the intertidal zone. Raft culture entails growing shellfish on old shells that have been punctured, strung together and attached to raft-like structures. Longline culture involves growing shellfish on ropes or inside containers that are suspended from anchored or buoyed ropes. Seaweed is also farmed using off-bottom culture. Overall, off-bottom culture methods have relatively few environmental impacts.

Pens Pens are structures that hold farmed fish in open water as they grow. They're made with wooden, mesh or net screens, which allow water to flow freely through them. Net pens can be in marine waters to farm species such as salmon and trout or freshwater to farm species such as tilapia and trout. Types include pens, which are fixed to the bottom in shallow waters. Net pens are enclosed on the bottom and sides. Submersible net pens are fully enclosed and submerged, usually in offshore marine waters.	
Ponds Ponds enclose fish and crustaceans in a relatively shallow and usually small body of freshwater or saltwater. They vary considerably from simple, low-tech extensive ponds to sophisticated hyper-intensive ponds where farmers have significant control over the rearing process and pond conditions and production per hectare is very high. Historically, ponds were built along the coast and contributed to the destruction of mangrove forests. If water is discharged without treatment or screening, it can impact the surrounding environment or allow farm-raised species to escape. Closed systems, where water is treated and used for multiple production cycles, reduce the risk of escapes and pollution. Shrimp, catfish and tilapia are commonly raised in ponds.	

Raceways Raceways are long, linear containment structures used for farming fish. They're often in a terraced configuration and usually above ground. These systems can be indoors or outdoors. Types include flowthrough where the wastewater leaves the facility and recirculating where the water is treated and re-used. Treating wastewater can greatly minimize environmental impacts, which can include contamination of waterways and spreading disease to wild fish. Species such as tilapia and rainbow trout are farmed in raceways.	
Recirculating tanks Recirculating tanks have continuous water flow, and the wastewater is treated and re-used. These systems can be indoor or outdoor, and they're usually above ground. This farming method addresses many of the environmental concerns associated with aquaculture. The farms can be built in a variety of locations to avoid sensitive habitats. They can also minimize or avoid the discharge of pollutants beyond the farms. The potential for disease and parasite transfer to the natural environment is low, and escapes of farmed fish can be prevented. Many finfish species such as Arctic char, striped bass and sturgeon can be raised in land-based, recirculating tanks.