

Destructive fishing

All fishing is destructive in some way. The removal of any marine species, particularly in large numbers, will affect the complex web of connections between all marine species. And most fishing methods catch other unwanted species referred to as by-catch.

Although fishing always affects the marine environment and ecosystems to some degree, some fishing gear and fishing methods are just too destructive and their use must be controlled.

Fishing can be regarded as destructive if it ...

- causes physical damage to nearby areas, say by digging up the sea floor or breaking coral
- kills a large number of species in addition to the ones being fished.
- is so efficient that not enough fish are left in the sea to reproduce

The last listed point is a difficult one. Most fishers want to fish as efficiently as possible. However, some fishing gear and methods are overly efficient – a small mesh net set across a gap in the reef, for example, may catch all fish attempting to swim through the passage.

The major aim in all fisheries management is to make fisheries sustainable. That is, to make sure that fisheries will still be there to provide seafood for our children and their children. We must always leave enough fish in the sea to reproduce and provide fish for the future. And, of course, we must look after the places in which fish live; we must take care of the environment – the coasts,

mangrove areas and reefs. And, as what happens on land will affect what happens in the sea, we must control run-off containing sediments and wastes.

The following is a list of damaging fishing gear and methods used in Pacific Islands.

► Explosives such as dynamite

Explosives such as dynamite (often obtained from mining operations, road works and even police) are used for fishing in some Pacific Islands. Explosives are either thrown from a canoe into a school of fish such as mullet, or set on coral where fish have been encouraged to gather by setting bait. Explosives are many times more damaging to small animals, such as fish larval stages and coral polyps, than they are to large fish. Although the use of explosives is illegal, the practice may be tolerated in isolated communities in which the illegally caught fish are shared. A cartoon used to make the public aware of the long-term damage done by using explosives for fishing is shown at right.

When you want a coconut
you don't chop down the whole tree



**So, when you want a fish,
DON'T kill the whole reef**
People who use dynamite and chemicals
to kill fish are destroying our reefs.
They are also destroying our future.

All communities should support
the national government in
preventing the use of explosives
for fishing.

► Toxic chemicals

In some countries, commercially available poisons such as bleach (sodium hypochlorite) are used to catch fish. Bleach may be poured into pools that have been isolated at low tide to stun and capture small coral fish. The bleach will also kill all other small animals, including corals, with which it comes into contact.

All communities
should ban the use of
chemicals for fishing;
government should
require that warnings
are placed on
containers of bleach.





Destructive fishing

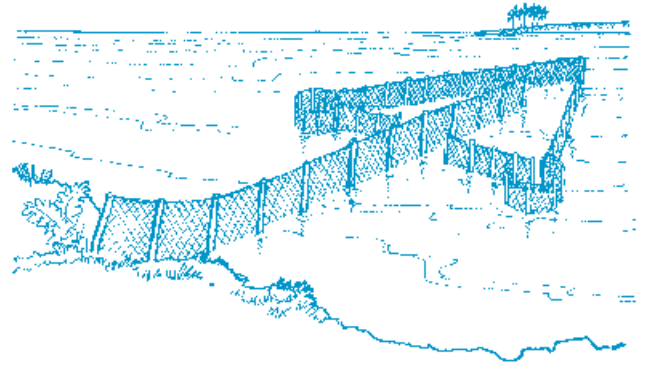
► Fish traps and fences

Barrier and fence traps are some of the oldest ways of community fishing. The simplest traditional traps use the falling tide to strand fish in v-shaped or semi-circular walls of stone or coral. Barrier nets can be set across reef passages and channels to trap fish as they try to return to deeper water on a falling tide.

Fence traps usually consist of a fence or wall built at right-angles from shore-lines and reefs to guide migrating coastal fish into a large retaining area. When fish meet the fence they swim along it until they reach the retaining area from which it is difficult to escape. Designs are often traditional and vary between regions.

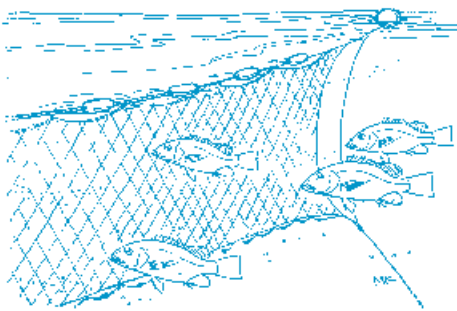
All communities should limit the number of fence traps that can be built in their adjacent fishing areas.

Although originally made from stone or coral blocks by an entire community working over many months, such traps are now usually made from modern materials such as wire-mesh netting as shown in the figure. Now each community may have several family-owned fence traps. The excessive use of fence traps has resulted in the loss of fish stocks such as mullet in Tonga. Some communities in Samoa have limited the number of fence traps that can be built in their adjacent fishing areas.



► Gill nets

Gill nets are panels of netting held vertically in the water by a series of floats attached to their upper edge (the floatline) and weights attached to their lower edge (the leadline). These nets are anchored in shallow water to catch several species of fish including mullet and mackerel. The nets are often made from almost invisible nylon strands, which lock behind the gill covers of fish, and are anchored in shallow water.



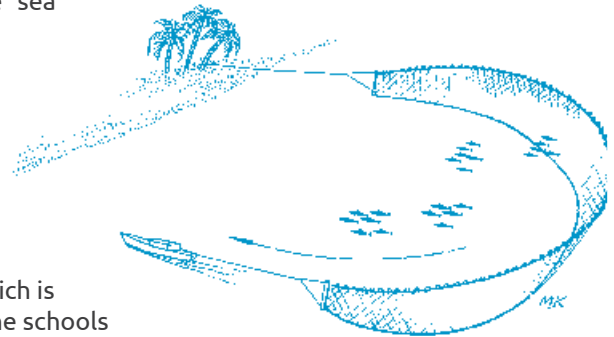
Problems occur when gill nets are set across narrow reef passages, channels or the mouths of rivers. In these cases, no fish will be able to pass the nets. This method of fishing is particularly damaging in cases where nets are set to catch fish swimming to a spawning aggregation site (see *SPC Information Sheet 24*).

All communities should place conditions on where gill nets can be used. Minimum mesh sizes have been set by many governments.

► Gear that is dragged across the sea floor

Fishing nets that are dragged across the sea floor are more damaging to the environment than nets that are left in one position. Trawl nets are towed behind fishing boats to catch species such as prawns in Papua New Guinea and Hawaii. These nets catch large numbers of different marine species and can damage large areas of the sea floor.

A seine net (sometimes called a beach seine if it is set from the shore) consists of a long panel of netting which is set around shore-line schools of fish and dragged ashore. The net is weighted to keep the lower side of the panel in contact with the sea-floor, and has floats to keep its upper side at the sea's surface. Some beach seines have a central panel of loose netting which forms a bag (or codend) to retain fish. Ways of employing beach seines vary, although in many cases, one end of the net is anchored on the shore, and a boat is used to set the net in a large arc and back to the shore before hauling (see illustration). However it is used, a seine net will catch most fish in its path and can damage coral and beds of seagrass.



All communities should place conditions on where beach seines can be used and require minimum mesh sizes.



► Fish drives

A fish drive is a group activity that often involves the whole community. Nets are set in a shallow part of the water on a reef plateau or lagoon and fish are driven into the net by swimmers and scare lines. Fish may be herded with coconut leaves tied to a rope or scared by splashing the water surface with sticks and throwing rocks. The fish may then be concentrated in one part of the net for hauling, or are speared by swimmers.

All communities should ban fish drives or at least limit the number of places where they can take place.

Fish herding and scaring may also be used without nets; fish are driven into an area where they can be easily speared, or they may be herded into a large trap or woven basket. Such fish drives often cause considerable damage to the sea floor and corals.

► Poisonous plant material

Poisonous plant material is traditionally used to catch fish. Plants used include the climbing vine, *Derris*, and the fish poison tree, *Barringtonia asiatica*.

All communities should ban the use of plant poisons for fishing.

Derris is a climbing plant belonging to the pea family. Its roots can be ground to produce rotenone, a poison that can kill insects and fish. Rotenone or derris powder is believed to be extremely toxic and damaging to the environment.

The fish poison tree grows in mangrove areas and, as the water-resistant fruit drifts on ocean currents, it is distributed widely across the Indian and Pacific oceans. The seeds, which contain the poison saponin, can be ground to a powder and used to stun or kill fish. A photograph of a tree is shown and its large pinkish-white flower and seed are shown in the inset.

Pastes from these plants are used in various ways. Fishers may drive the fish into the shelter of a preselected coral head where two or three parcels of poisonous material have been placed.



► Picking by hand or gleaning

The collection of marine animals and seaweed in lagoons or on the reef flat at low tide is a common way of fishing, particularly for women and children. A variety of species are collected in this way, including sea cucumbers, sea urchins, crabs, shellfish, seaweed, eels, small fish, worms, jellyfish and octopus. Collection can be done by hand, by digging in the sand or mud with the feet for bivalves, by overturning or breaking corals and rocks, and by using sticks and metal hooks to draw octopus, crabs or fish from holes in the reef.

All communities should ban the breaking of coral to catch fish.

Gleaning is an important method of obtaining food, particularly when the weather is too rough to go to sea. Although individual catches are often small, the collective catch made by many fishers is often large and the combined impact on the intertidal areas can be damaging. In some countries, people deliberately smash corals to catch sheltering fish – some Samoan communities have banned this destructive method of fishing called *fa'amo'a* and *tuiga*.

► Spear fishing at night

Spear fishing is a common method of fishing in many Pacific Islands and can be a method that causes little harm to species or the environment. However, the availability of cheap underwater torches has allowed fishers to go fishing with spears at night. This method of fishing is particularly devastating to fish that sleep in the corals and in shallow reef areas.



At night some fish such as parrotfish sleep in crevices or holes after wrapping themselves in a transparent covering or cocoon of mucus. The mucus may repel parasites or hide the scent of the fish from night-time predators. These sleeping fish are very easy to spear and in some cases large parrotfish have been removed from entire lagoons. The loss of plant-eating fish such as parrotfish has resulted in corals being replaced by seaweeds on some reefs (see SPC information sheet 29).

All communities should ban the use of spears for fishing at night and reduce fishing on plant-eating fish.



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▶ Traps, nets and ghost fishing

Several types of fishing gear continue to fish after being lost or abandoned. Even without bait, some traps continue to trap fish and gill nets can continue fishing for many years after they are lost. This type of fishing is called 'ghost fishing' and is of concern in many parts of the world.

All abandoned fishing gear should be removed from lagoons and the water's edge.

To prevent 'ghost fishing' by lost traps, some authorities insist that traps are made from material which rots away after being left in the water for a long time. Gill nets made of plastic material (monofilament nylon) do not rot and remain in the sea for a very long time, sometimes rolled up into a ball that entangles marine life.

Destructive fishing is not only due to the use of modern materials – some traditional fishing methods are also damaging. In the past the marine environment was able to sustain occasional, localised damage because the frequency of the activity was low and fewer people were involved.

But populations are growing at close to 4% per year in some island countries – this means that their populations will double in less than 20 years. If it is hard to get enough seafood to feed people now, just imagine how hard it will be to do so in 20 years.

Removing particular species from an area will always have consequences. This is because every species is part of a complex food web – a very simplified one is shown below. In the absence of fishing, the species present are in some sort of balance even numbers of individual species may vary naturally from year to year.

Removing any species in large numbers, say by heavy fishing, will affect the balance, sometimes in unexpected and disastrous ways. Each species is likely to be a predator, prey and competitor to a range of other species and its removal by fishing will have consequences. This flow-on of

▶ Use of underwater breathing apparatus

The use of underwater breathing apparatus, or SCUBA gear makes some fishing too efficient. In some cases, for example, entire reefs fronts have been stripped of lobsters by divers using underwater breathing apparatus and sea cucumbers have been collected from deeper water. Some governments have banned the use of underwater breathing apparatus either for all fishing or for catching lobsters.

All fishing communities should ban the use of underwater breathing apparatus for fishing.

▶ Illegal fishing

In the Pacific, foreign fishing vessels have been involved in illegal fishing of fish, sea cucumbers, trochus and giant clams. Illegal fishing is damaging in that the fishers involved do not respect national and local rules on fishing.

Communities should report all cases of illegal fishing to government authorities.

the effects of removing a species from an ecosystem has been called 'trophic cascades' by scientists.

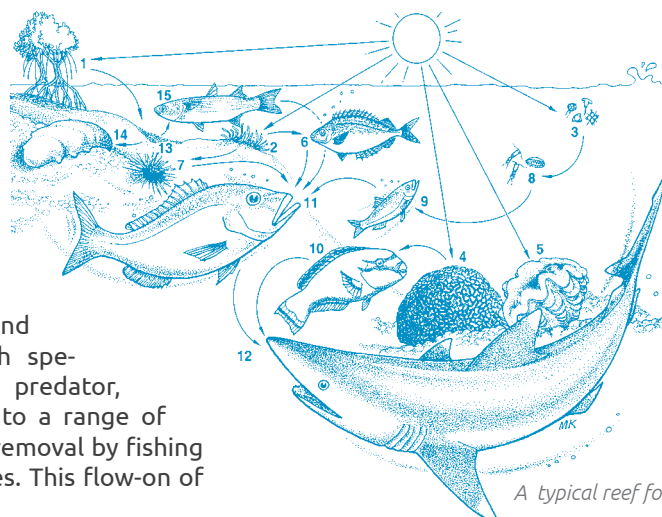
Two examples are the indirect effect that fishing can have on seagrasses and coral reefs.

In some cases entire seagrass beds have been lost due to the overgrazing of seagrasses by population explosions of sea urchins. The sea urchins increased in numbers because their predators, triggerfish, were removed by overfishing.

Corals are kept healthy by the actions of the plant-eating fish that keep large seaweeds from competing with corals for space. The growth of seaweeds has become a problem in cases where many plant-eating fish, including parrotfish,

unicornfish and surgeonfish, have been removed from the area.

Many non-fisheries issues including land reclamation, sedimentation, eutrophication, and pollution are most important in their impacts on marine ecosystems and fish stocks. This suggests that we need to manage fisheries on a much broader basis than just by looking after fish. Besides controlling destructive and overly-efficient fishing methods, we need to take action to protect mangroves, seagrass beds, coral reefs – all places on which fish depend. This broad approach is described in the SPC brochure 'Community resource management.'



A typical reef food web

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