The trial of the Great White Shark

Why is Biodiversity important?

"Finding out"

Learners take part in a mock trial in which a species is examined in terms of its role in nature

Grading:

Time:

Place: Inside

Group size: Whole class

Activity Outcomes:

Learners are able to:

- understand that species are adapted to live sustainably
- realise that a species is adapted to fill a special niche

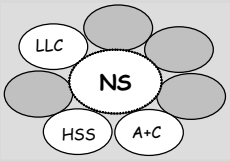
Assessment:

- Peer assessment of individual participation in mock trial
- Facilitator evaluates research done by classgroup

Skills:

- Research and investigate biological and social characteristics of organisms
- Understanding concepts and principles of biodiversity – critical thinking
- Respect and appreciate the role of each organism in natural systems

Learning Area links



Background

When issues related to **sustainability** are discussed, the focus is almost always on people and their activities. We share this planet with thousands of other living organisms. Studying species in terms of how they are adapted to live in a specific habitat, the contributions they make towards the sustainability of a community and in which ways they live by certain ecological principles (See activity 1.5: Eco-Logic) can be an riching experience, which could help develop positive value systems toward life and living. It could also serve as a basis for the understanding of the principles which determine whether an organism lives sustainably i.e.:

- It does not take more from the environment that it puts back.
- It always lives in an interdependent relationship with other organisms with which it shares a habitat.
- It is adapted to a specific environment and niche.
- It does not produce products which create conditions that may be harmful to itself and other forms of life.
- It can reproduce.

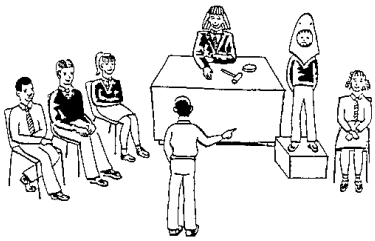
A mock trial is most successful in developing critical thinking skills and clarifying values among participants.

Activity Guidelines

Needed: *Copies of pages B17 - 19).*

- As a classgroup, do research on court procedures.
- The learners will decide on one of the following roles he/she wants to act out:
  - A judge
  - A counsel for the defence
  - A counsel for the "state"
  - A "defendant" (i.e. shark)
  - A few witnesses for the defendant;
  - A few members of the jury

- Supply the defendant (and his counsel) with background materials on the Great White Shark and the opportunity to study it for 15 minutes.
- Give the counsel of the state information and time to discuss their strategy.
- The court now takes session. The shark is formally charged for being dangerous to humans and can easily be missed in our oceans.
- Allow the counsel for the state to question the accused (he/she can consult with his counsel)
- After that, give the counsel for the defence the opportunity to question his/her client. He/she can also call witnesses (seals, crabs, killer whales).
- The judge presides and sees that proceedings are orderly.
- The jury is given the opportunity to discuss the evidence, and one of them delivers the **verdict** of guilty or not guilty, with full reasons for their decision.



Variations

Interview

The facilitator can play the role of the shark while the group interviews him/her, or this could be extended to put a human on trial.

New Species

In groups, learners could be asked to design a "new species" that can live sustainably in a vacant niche that has been created. Each group will have to define the niche chosen for their "new species". They will present the design to the class. The presenters will need to defend its sustainability to the class.

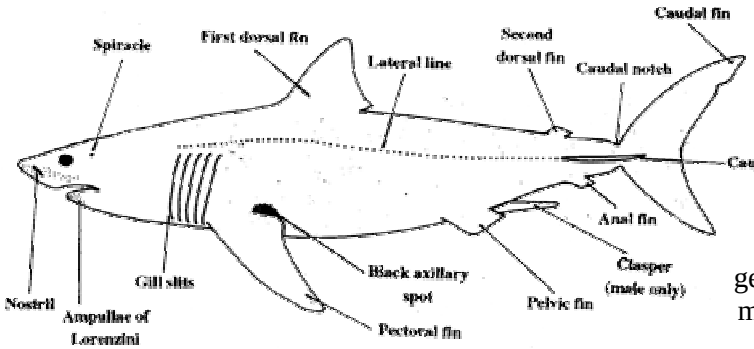
See Teacher Guide 1, page 7

Organise an exhibition with all the people in your community who are working on sustainable management projects to show others what can be done and how they can become involved.

THE GREAT WHITE SHARK

WHAT IS THE GREAT WHITE SHARK?

The great white shark, *Carcharodon carcharias,* is a very large, fast-swimming predatory fish mostly of cool, coastal waters. It is found worldwide and has been known and feared since ancient times as a maneater.



External anatomy of the great white shark.

Habitat

The great white is chiefly a continental, near-shore fish of the world's temperate seas. It does not avoid the tropics (especially large individuals), but may make only sporadic appearances in some regions, especially Central America, tropical South America and the central Pacific islands. Many records from isolated areas show that it is capable of ranging widely and even crossing ocean basins. Great whites stay mainly in near-surface waters, especially when hunting, but one has been caught on the bottom hook and line rig at a depth of 1280 metres.

Known areas of abundance for the great white perhaps reflect its interaction with man (sport fisherman, beach bathers, scuba divers and surfers). These areas include California, the Mid-Atlantic States of the USA, southern Africa and eastern Australia, New Zealand and some Pacific islands.

Size

Great whites measure 109-129 cm at birth. Size and sexual maturity varies individually. Males mature at 3,5 to 4,5 m and are about 9 years old. Females around 4,5 to 5 m and 12-14 years old. Presently it is unknown if males grow to a larger maximum size than females, though most of the largest (over 5 m) seen are females. Many incorrect maximum sizes have been reported over the past years; one at 36 feet (11 m) that persisted for decades was apparently a typographical error for 16 feet .The largest great white caught in recent years were not measured, but researchers have little doubt that one from Malta and another from South Australia were over 7 m total length These sharks would be approaching 30 years of age. A 6 m female recently caught in Gans Bay and examined by the Shark Research Centre, Cape Town, would have been about 22 years old, if one vertebral band equals to one year.

Reproduction

Fertilization is internal in the great white and females give birth to live young (they are ovoviviparous). Courtship behaviour is unknown, but scientists think that scarred individuals suggest male-male aggression or that a male's gentle biting of females may precede mating.

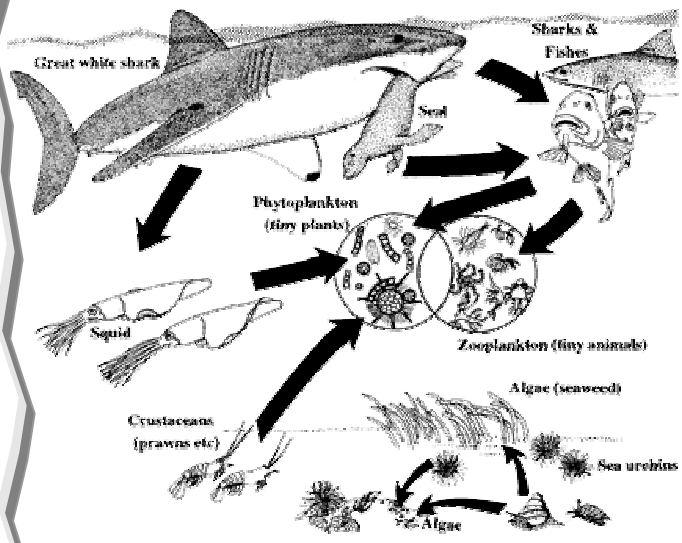
Food and Feeding Habits

It is known, even among land-locked people the world over, the great white shark is a top predator. The sheer size, power and fearsome jaws of this creature demand such an observation. But surprisingly, great whites also scavenge carrion and garbage. Researchers have recorded prey items based on stomach contents as follows: bony fishes of many varieties and sizes of pilchards to sturgeons; Cartilaginous fishes, including other larger sharks and rays; sea turtles; birds; including gannets; gulls and penguins; marine mammals like dolphins, porpoise, seals and dead whales; invertebrates including abalone, other marine snails, squid, cuttlefish, starfish and crabs.

Off seal colonies, great whites larger than 3 m evidently shift their diet from mostly fishes to seals. Jackass penguins are occasionally bitten by great white but these birds are seldom seen in their stomachs. Especially important feeding areas include Bird Island, Eastern Cape, and Dyer and Robben Islands, Western Cape. However, in tropical areas where the seals are rare or absent, great whites are perfectly capable of surviving on bony fishes, other sharks and marine mammals .It is important to note that whatever specialized predatory preference develops in one may not occur in other areas, as these large sharks are capable of ambushing, or otherwise catching, just about anything that swims in the sea.

Large live seals must be among the great white's most difficult prey. They are usually killed by a sudden burst of high speed that may throw the seal completely out of the water, with"bite" and "spit" behaviour. This action is viewed by

scientists as a defensive kill; in other words, sharks are protecting themselves from the claws and teeth of an agitated, wounded animal. Penguins have been seen to be repeatedly tossed about like this off South Africa. This behaviour may not be part of an actual feeding repertoire, but may be more "playful" (except to the penguin!), or " testing", in the case of young sharks. Wounded, dying prey will then be circled by the shark until it is sufficiently weak, then consumed. In the context of the next section it is important to understand the great white's marine mammal feeding strategy as outlined here.



Food chains show where animals get their energy from. Great white sharks are at the top of the marine food chain.

ATTACKS ON HUMANS

One of man's deepest primal fears is that of being eaten alive by a wild animal. Perhaps the greatest part of the mystique of the great white concerns its long history of attacking people for just such a purpose.

Why are great whites dangerous? Contrary to some popular counts, they are dangerous simply because we, as land dwellers, do not naturally fit into the ocean environment where these large, fast predators view humans as potential prey. They may also react to people in the water as territory invaders that need to be chased off, possibly explaining the many single-bite attacks attributed to great whites where victims have survived. Some sensational portrayals of sharks, particularly certain films and books of a by-gone era, have warped their natural predatory behaviour to instill horror in us by depicting hate-filled monsters bent on mindless destruction or revenge. Nothing could be further from the truth.

Advice to Bathers, Surfers and Divers

Even if great whites are simply part of the natural world and are not malicious, precautions need to be taken while in their world, just as wildlife tourists in our game parks take precautions against attack by predators such as lions. Below are some helpful guidelines we hope may serve to avoid a shark attack.

1. Never swim alone, or wander far from a group of others in the water, thereby isolating yourself as a target. Many of our beaches have lifeguards or are protected by anti-shark nets and these areas should be favoured by bathers.
2. Leave the water immediately if surfing or bathing and a large shark is seen. To scuba divers, many sharks will not recognize humans as prey, but may feel threatened by their presence. Leave the water if circled, bumped, or if a shark arches its back and twists from side to side in an exaggerated fashion. This is a pre-attack warning behavior. Do not, however, count on a shark to circle, pass close or threaten before it makes a direct charge.
3. Blood is an attractant to sharks, whether from the fish, birds or mammals. Do not tow speared fish; remove them immediately and do not hang them in the water over the side of boats. Women should avoid the sea during their menstrual period. People have been attacked by sharks in knee-deep water.
4. Avoid swimming or surfing in murky waters, such as off estuaries. Keep a watch out for shadows and movement around you while diving in reduced visibility. Leave the water if shoals of fish around you behave in an erratic manner, particularly near drop-offs or in channels.
5. If diving from a boat, take care to observe the sea for a few minutes before entering the water. Sharks may surface and submerge repeatedly over the short intervals. Exit the water upon reaching the surface quickly, with minimal fanfare.
6. Avoid swimming far offshore at dusk or at night. Many sharks search for prey at these times. Night divers need to be particularly wary when diving in known shark-inhabited areas. Move slowly about and avoid flashing your torch around the water column needlessly.

7. A popular myth is that if dolphins are around it is safe, since dolphins chase sharks away. Dolphins will not chase sharks unless protecting new-borns or if they feel threatened in some other way.
8. Never molest or provoke a shark in any way, no matter how small or harmless it may appear. It is disrespectful of nature to do so; it may get you a nasty bite that could lead to greater trouble later.

Treatment for Victims of Shark Attack

Despite all precautions, in the eventuality of an attack there are several important things to know:

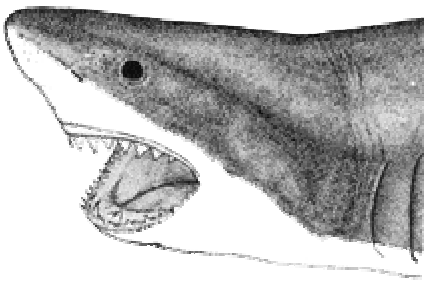


Figure illustrating the "gaping" threat behavious of the great white shark

1. It is most important to staunch the flow of blood as quickly as possible. A tourniquet to limbs may be needed between the wound and heart, taking care it is not too tight. Place compress bandages of anything soft and pliable at hand directly on wounds. Keep the victim immobile and as warm as possible. Summon medical emergency aid immediately, even for what may appear to be minor wound.
2. For major injuries to surfers or bathers, lie the victim parallel to the sea on dry sand and raise the legs to promote blood flow to the head. Do not place a victim head down to the water's edge. Help the victim to breathe if necessary.
3. While awaiting medical aid, keep the victim conscious and calm by speaking reassuringly. Do not attempt to carry the victim off the beach or boat to a private vehicle to dash to hospital, as this may promote the onset of shock.
4. Do not give any drink, especially of alcohol, as this may help lower the body's core temperature and aid the onset of shock. Water may be used to wet the victim's lips.

FISHING FOR GREAT WHITE SHARKS

In South Africa, trolling off the seal or penguin colonies was a more common practice until this became unlawful in 1991. On Durban's South Pier, during, the heyday of the Union Whaling Company in the 1950s and 60s, large sharks were attracted into Durban harbor by blood. Shore fishermen devised a long pole and ladder-line rig to get large chunks of whale meat far into the harbor entrance and, after hooking a shark and playing it for hours, usually roped it up to the pier by its head. Most of these fish were Zambezi or tiger sharks, but many great whites were taken too.

MARINE CONSERVATION

In South Africa, protection for the great white was a world first, thanks in large part to a long-term research programme organized by the Shark Research Centre, Cape Town. Researchers, conservation groups, sport and commercial fishing interests and private citizens joined a debate that resulted in the 1991 Act that include a total ban on intentionally catching, molesting and commercially utilizing great whites (or parts like jaws), with heavy penalties for violators. Objectives to the Act came primarily from sport and commercial fishing interest that had profited from their capture (mainly the sale of meat and prepared jaws)

Much emotional debate, as with that aimed at protecting the great white, has centered on the KwaZulu-Natal nets. Probably central to the debate is that the vast majority of sharks caught and killed have never been implicated in attacks on humans and most likely would not attack unless provoked. Reactions to the nets run gamut from keeping the nets up to protect the public (and foreign tourists!) at all costs from mindless killers, to a complete ban on the nets for all time, thus making people who venture into sharks territory take responsibility for their actions.

http://sacoast.uwc.ac.za/education/resources/envirofacts/greatwhite.htm