



Noise Pollution

Dolphins face numerous threats, some of which we want to explain more closely in our newsletter. This month we will focus on noise pollution.

Noise pollution (or environmental noise) is defined as displeasing human or machine created sound that disrupts human or animal life. The word "noise" comes from the Latin word *nausea* meaning "seasickness", or from a derivative (perhaps Latin *noxia*) of Latin *noceō* = "I do harm", referring originally to nuisance noise.

In humans, the effects of noise pollution are both health-related and behavioral in nature - noise can damage one's physiological and psychological health. It can cause annoyance, aggression, hypertension, high stress levels, tinnitus, hearing loss, and other harmful conditions.



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Biologists have coined the term "noise pollution" and are worried about what effects it may have on marine mammals. The primary concern is that the oceans have become very noisy, and the level of noise is on the increase. Furthermore, marine mammals depend on sound in order to find their bearings as well as to feed, reproduce, and socialize. Does noise represent a serious threat to dolphins and whales?

Noise pollution and marine mammals

Echolocation is a sonar technique used by whales, dolphins and seals for thousands of years in order to communicate and to find their prey species during hunting. Their sense of hearing is a lot like our sense of sight in many ways – their most important sense.

In the recent past, ambient ocean noise levels were low enough that whales using sonar were able to communicate with each other across entire ocean basins. Recently though, with an increase in underwater noise pollution, communication between whales is more difficult than ever. There is even a growing body of evidence that suggests that noise is driving dolphins and whales away from their original habitats. Without sonar, many cetacean species will be unable to hunt for food, find mates or communicate with each other.

Sources of noise pollution

Undersea noise pollution comes from a variety of sources but can include large ships, underwater exploration and mining, and sonar.

Modern day supertankers cruise the oceans creating extremely loud sound pulses of 190 decibels or more at a frequency below the 1000Hz range, very close to the frequency bands used by whales for long range communication. With globalisation, the merchant fleet has doubled in size and quadrupled in tonnage. All of these ships (tankers, tug-boats, freighters, ice-breakers, etc.) fill the seas with a constant rumbling, creating a wall of white noise. The impact of this form of pollution is all the

more disturbing as sound also travels faster and further in water than in air, and high intensity sound in the oceans may be heard over thousands of miles.

Other sources of noise in the oceans are the oceanic exploration for oil and minerals, and a scientific process known as Acoustic Thermometry. Acoustic Thermometry uses pulses of low frequency sound (at 195 decibels) to try to determine the average temperature of the oceans. "Pingers" and "Ringers" are devices meant to keep animals away from fishing operations. Pingers are used to keep dolphins and porpoises away from commercial fishing operations. Ringers keep them away from aquaculture developments. Both kinds of devices create a constant noise, which can interfere with or even disrupt the normal behaviour of dolphins.

A recently developed device called Low Frequency Active Sonar is currently awaiting final approval. The idea behind Low Frequency Active Sonar (LFA) is for the detection of quiet submarines in the ocean. The sound 'pings' from the sonar system will be in the 100-500 hertz range with a starting sound level of 215 decibels. Sound travels extremely well in the oceans so this amount of sound will likely travel across entire ocean basins. The problem with this sonar system is that, at relatively short distances, it has the ability to injure some cetacean species because of the high sound levels. There should be an effort to design passive sonar detection systems, which would do little or no harm to the cetacean species.

Harmful effects on Whales and Dolphins

The effects of noise pollution on whales and dolphins depend on, among other things, the distance they are from the source of the noise. If the sound is very powerful and close to the animals it could very well bring about permanent ear damage, internal injuries, and even death. Even sounds less powerful can induce temporary deafness, as was shown by studies carried out on seals, dolphins and belugas in captivity.

As well as physiological effects, sounds that derive from human activities can have an effect on cetacean's behaviour. Studies have shown that relatively powerful sounds can cause cetaceans to deviate from their original trajectory, diverting from their normal migration paths. Chronic exposure could even force marine mammal populations to abandon habitats completely. Noise can block communication attempts between cetaceans or limit it to a very small area, and it can cause general problems of stress and panic.

When exposed to low frequency sounds, certain species of cetaceans stop vocalising for a few hours or even a few days. Moreover, even when thousands of kilometres from sources of noise, whales could suffer from the increase in background noise, which could mask certain important sounds. This effect could mean the difference between detecting prey or not, escaping a predator or not, finding group members or not. It can, under certain circumstances, be a question of life and death.

What can humans do to curb noise pollution?

- We have to update any existing laws/acts for marine mammal protection; e.g., ACCOBAMS (The Agreement on Conservation of Cetaceans in the Black and Mediterranean Seas) adopted guidelines for the limitation the impact of anthropogenic (man-made) noise on cetaceans in the agreement area
- Governments should legislate with habitats in mind to ensure that important areas would receive the least impact possible
- Move the major shipping routes away from important habitat areas
- Isolate the ships' engines from the hull to reduce the noise output into the ocean
- Determine acoustic hotspots (such as whale breeding grounds) and stop mineral exploration in these areas
- Site the devices for the Acoustic Thermometry project properly
- Develop passive sonar systems for submarine detection
- Study impacts of Pingers and Ringers to see what their long-term effects are

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