

## Discord over sounds in the silent sea



**S.Ananthanarayanan** recalls a news report last week of conservation groups protesting about the effects of the US navy's sonar on marine life, especially whales.

Can sound waves in the sea affect marine life?

### Sound in water?

Eardrums, or things like microphones, detect sound by being put into physical vibration by sound waves striking them. If the waves are low frequency, we hear a deep sound, and if the frequency is high, we hear a shrill sound.

We usually hear sound waves in air, but those of us who swim may have noticed that we can hear things even when under water. This happens when the sound waves set the water vibrating and the water transmits the wave motion to our ears. It is the same if the source of vibrations were within the water, because water is as effective a medium to carry mechanical vibrations as air.

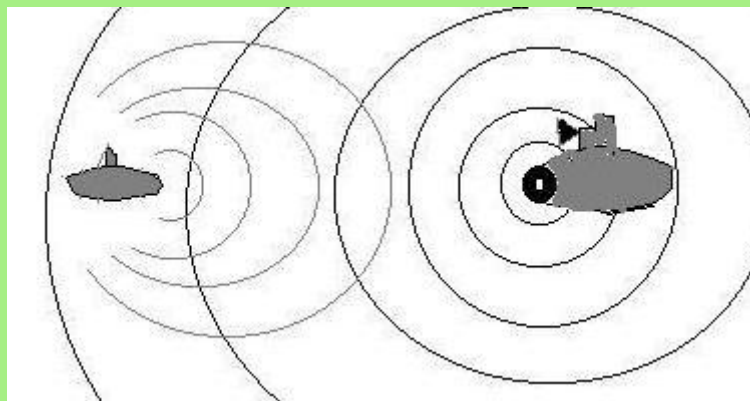
### The nature of sonar

Sonar is a way to detect things by listening to sound reflecting off them. Using light as a detector has its advantages and limitations. For example, to pass through the vacuum of space, or for the details that most animals need to see, it is only light that can fit the bill. But for use to detect things over a distance on the earth, a chief disadvantage is its limited range.

Sound waves, on the other hand, travel freely in air or water. Bats, for instance, which need to detect obstacles or moving prey, at night, can use high frequency sound, as a 'searchlight'. The range of interests is just tens of metres, and if the frequency is high, the reflection contains enough detail for the bats' purpose.

When the range is a few kilometres, like in the communication needs of elephant herds, low frequency sound is effective, it conveys less detail, but carries long distances. But it is still no good for distances over a few kilometers. For aviation, for instance, it is RADAR, which is a very low frequency light wave, that needs to be used.

But in water, sound waves have pretty good range, while light or radio waves have practically none. Hence, using a source of sound, and listening for the echo, is the method of whales and dolphins and also of submarines or ships looking for things under water.



### **The US navy**

Sonar still has only a few kilometers range, in water. But the US navy would like to detect things tens or even hundreds of kilometers away. So they do two things, one is to use real low frequency sound, which has the longest range, and then, they use real loud sounds!

Low frequencies fall right into the range that whales and dolphins use, and to which their ears are the most sensitive. And when a submarine blasts the sea with a sound to carry a hundred kilometers, one can imagine what this would do to those in earshot!

Conservationist groups found that post-mortem of hundreds of whales, beached in the Bahamas, showed signs of bleeding within the inner ear and the groups have raised protests against the US navy.

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