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Classics: Fishing down the web

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A Classic…

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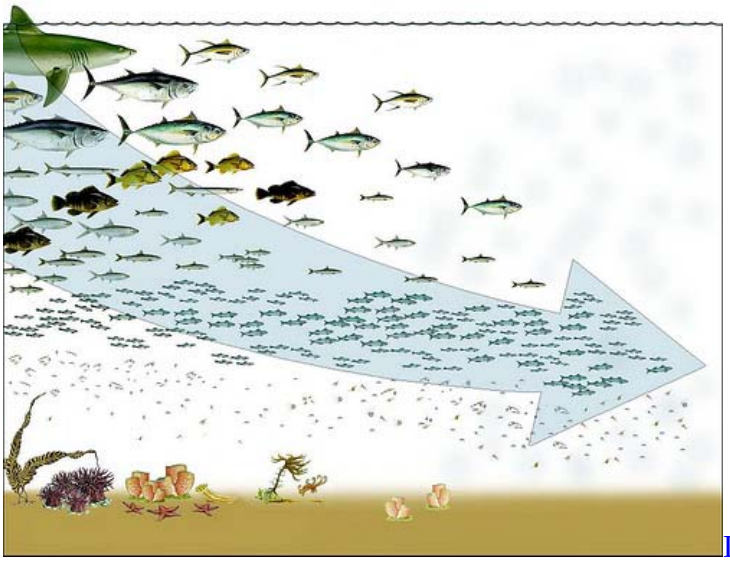

Daniel Pauly and colleagues' classic paper in *Science*, Fishing down marine food webs, is one that merits citation in ConservationBytes.com Classics section. The trend identified by Pauly and colleagues is fairly simple - data from the Food and Agriculture Organisation (FAO) of the United Nations revealed that the average trophic level (i.e., the position in the food web relative to autotrophs - primary producers such as phytoplankton) has declined by an overall average of 0.2 units. In this case, a trophic unit varied from 1 (phytoplankton) to 4.6 (e.g., snappers, family Lutjanidae). The trends varied by region and whether or not one takes certain overrepresented species into account, but the average decline was more or less consistent across the dataset.

What does all this reveal? Put simply, it means that fishing on a massive and global commercial scale has essentially removed many of the larger species to the point where it has become no longer economically viable to sustain a targeted fishery. This does not necessarily mean that these species have disappeared, but it does indicate a large drop in relative abundance (and thus, ease of capture) necessary to support an industry, with the corollary that highly reduced populations are now much more extinction-prone if they fall below their minimum viable population size. The corollary is that marine species we wouldn't consider palatable for a dog 50 years ago are now considered top-quality market delicacies.

The paper did not go without critique - Caddy and colleagues argued that Pauly and colleagues oversimplified the case for marine fishes and misinterpreted some data; however, a subsequent paper by Pauly's team published in 2005, Fishing down marine food web: it is far more pervasive than we thought, argued that the original paper didn't go far enough, and that fisheries over-exploitation worldwide is much worse than originally reported. Indeed, there are certainly some high-profile examples to support the case (e.g., the Atlantic cod and Peruvian anchoveta fisheries collapses, to name a few).

What did this do for biodiversity conservation? I think it can be argued that this is one of the first big papers to identify that the over-fishing problem was global in extent and massive in magnitude, and that high-seas over-exploitation was stripping our seas of its bigger (generally slower-growing and more extinction-prone) species. I believe things have changed for the better, but we're still a long way off. Fishing in international waters still operates without an international body to enforce regulation and document catch precisely, and the classic *tragedy of the commons* applies so well to fisheries that it should be one of the principal examples used to illustrate the concept. People tend to jump up and down about elephants, pandas and whales, but the reduction in fish worldwide is a biodiversity crisis in progress that has not attracted nearly enough attention. We need more papers like Pauly's on this issue, as well as demonstrations of the loss of marine ecosystem function and services with the loss of species brought about by excessive fishing harvests. Only then can we expect the careless greed driving quick-profit high-seas fisheries to ease up enough to prevent extinctions on a massive scale.

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