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The Scientist as Communicator



Pauly describes himself as a synthesis. A war ba the son of a soldier from Arkansas and a French "Statistically, I was doomed," he once told me. Bu spending part of his early years working with mer handicapped people, Pauly received a scholarshi Protestant church in Germany to finish university. studied at the University of Kiel, surging through undergraduate and masters degrees in four years concerned about poverty and the impacts of over started working in tropical regions of developing c

where he invented simple but effective methods of stock assessment that could be use scientists. His goal was to enable local scientists to interact with scientists across the { participate in international conversations about fisheries management. Pauly views thi best technical contribution to the field of fisheries. Creating innovative tools that enable scientists and managers to do ever-better science, and sharing this knowledge with ot big part of what drives Pauly.

Q&A with Daniel Pauly

1. What is the most serious problem facing the ocean today?

There is no doubt — overfishing. Globally, fishing fleets are three to four times larger t necessary to take the present catches. The massive withdrawal of biomass that acco such an overcapitalized fleet has a tremendous impact on the functioning of marine ec even when the indirect effects of fishing, such as habitat modification due to bottom tr not considered.

2. Has there been an important 'win' for the ocean in the last decade?

Not really, despite the fact that we've seen an important change in the way information about the ocean has become available. Until about ten years ago, regulatory agencies like NOAA (National Oceanic and Atmospheric Administration), DFO (the Canadian Department of Fisheries and Oceans), and FAO (the UN's Food and Agriculture Organization) were the sole sources of information about the state of fish stocks and the general ocean. The information they provided conveyed to the public a strong sense that they need not be concerned about the ocean, and that fisheries could safely continue with business as usual.

In the last decade we've seen the emergence of an international cadre of scientists whose interpretations of global fisheries data have completely different implications for the ocean. The public has understood the difference and people are showing great interest in this new information. Also, environmental groups are devoting more attention to the ocean than ever before. Two trends (independent scientific studies and more involved NGOs) have made it possible for regulatory agencies to be challenged, and some 'wins' have been achieved as a result. For example, bottom trawling is now prohibited in large areas off the coasts of Alaska and

3. Do you think people have a true sense of what is happening to the ocean? Has their understanding changed in the last 5 years?

Though the new interpretations that I referred to above have improved public understanding of the dangers facing the ocean, the public still doesn't fully appreciate the extent of the crisis. This is especially true with respect to fishing — if current practices continue, it will be simply impossible for wild fisheries to accommodate our increasing demand for seafood. This is a serious issue that won't be alleviated by campaigns to eat the 'right' species.

4. Do you think we can fix the problems facing the ocean?

As a start, I think that we could make significant progress by reducing excess fishing and setting up large marine protected areas, accompanied by the regulation of bottom trawling and other damaging practices. However, we probably won't take these necessary steps unless the major countries or regions will, and they'll be able to reap the benefit of their wise decisions. The rest of the world is confronted with devastation.

5. What steps can people take in their everyday lives to help address the problems?

The expected answer to this question is generally that people should eat the right kind of seafood but I don't believe that a sufficient number of people will actually change their patterns of consumption. Seeing those changes in limited numbers just won't make a difference. Real change will occur only when people raise hell with their elected representatives.

6. In the next 5 to 10 years, what unforeseen problems will we need to address?

In the coming years, more and more people will understand the grave threat posed by global warming, and the reaction to this crisis will also dictate our attitudes towards fisheries. For example, the global fishing fleet consumes huge amounts of fuel and energy, and it will

be affected by any measures taken against the emission of greenhouse gases. In fact years, caring for marine ecosystems will appear frivolous because our very survival or will be at stake — that will be the issue to on which to focus.

7. You've been described as the most prolific and widely cited living scientist. What, in your opinion, has been your biggest contribution to fishery science?

One of my earlier contributions to fishery science was the development of simple methods for assessing tropical fish stocks. Scientists in developing countries could easily apply the methods, which enabled them to participate in the ongoing international dialogue about fishery assessments and fishery science more generally. I view this as my best technical contribution to the field, but the discovery and documentation of "fishing down marine food webs" is probably the contribution that people will most remember.

8. How do you view the scientist's role as communicator?

Ideally, scientists should be able to articulate the political implications of their science — not something that should be reserved for policymakers who are often very far removed from science itself. When scientists engage in policy debates, they are obviously involved in something where their scientific expertise does not automatically make them right, but it also does not automatically make them wrong, either. This concept is wildly misunderstood by those who believe that scientists should not participate in policy debates, which amounts to saying that scientific expertise is a handicap in those settings. I just don't see how accurate information resulting from rigorous scientific inquiry can be a handicap.

9. What do you consider to be your greatest success in communicating science?

Compelling graphics have helped immensely in getting my message across. My public also tends to combine a 'heavy' message with some levity in the presentation, and this seems just right to communicate the message effectively.

10. What is your vision or dream for the ocean and humanity?

I will answer like the candidates in Miss America contests: world peace! This response is deeper than one may think (and the beauties may know it too!), because world peace is achieved only when everyone can fully participate in his or her society. Full participation means that people are educated and employed, and therefore able to grasp the consequences of corporate actors wrecking the only planet we have. If we had world peace, leaders would have no tacit support for these destructive activities — full public participation would totally subvert the corporate agenda. World peace is subversive, so here's my dream: world peace.

[More on Daniel Pauly...](#)

He is probably best-known for his crystallization of the concept of "fishing down marine food webs." Pauly, with his University of British Columbia Fisheries colleagues - a team of fisheries scientists, modelers, and economists who have converged around him from all the world - took 45 years worth of the United Nations' annual global catch and diet data for 220 fish and invertebrate species, and examined their diets. Using Ecopath, a computer program that they designed to model ecosystems and species' interactions, they constructed models of all the food webs - who eats what and how much. Then for each species harvested, they determined its place within marine food web. They found that between 1950 and 1994, we systematically worked down the food chain, taking out the top predators. Not only was this a striking scientific finding, Pauly's ability to synthesize years of work and piles of data, to pare down these complex concepts into simple images and commentary has made "fishing down marine food webs" well known in the broader marine policy community. We are effectively eating everything in the oceans out of house and home, exhausting the ecosystem and its ability to recover from overfishing. As Pauly put it, "we are now eating bait...and we're headed for jellyfish."



Pauly, along with a growing number of other researchers, believe academic scientists have an obligation to make themselves heard when science is not put to use for the public good especially since scientists who work for governments are often censored and silenced and his colleagues have been a thorn in the sides of government organizations who downplay problems and cling to status quo.

In 2001, Pauly and Reg Watson challenged the very basis of international fisheries management by questioning the data reported to the United Nations Food and Agriculture Organization (FAO), the institution that keeps global fisheries statistics. Long troubled by the mismatch between what was observed - that everywhere one looked, individual fisheries were failing - with what was reported by FAO that global fisheries catch was holding steady, Pauly was determined to disconnect.

As a UN organization, FAO collects but is not able to verify the statistics reported by many countries, even when they are suspected of being wrong. No mechanism exists for independent verification of catch reports. Pauly, Watson, and other scientists are the forensic auditors of official reports.

Using FAO's catch data and a massive statistical analysis that compared the predicted catch against those reported, Watson and Pauly revealed errors in the official fisheries statistics. Their study, published in the prestigious journal *Nature*, showed that the Peoples' Republic of China had vastly over-reported their fisheries catch. These inflated numbers, combined with the large and wildly fluctuating catch of a small fish (the Peruvian anchoveta) painted a false picture of the health of the oceans: they masked an actual decline in global fisheries that started in the late 1980's, giving the impression that "business as usual" was sustainable.

When the study hit the news, the media ripples went straight to China. The response to the Associated Press by a Chinese official was, "well, we don't do that any more." China subsequently retracted this admission. The media stories brought the attention of the world to this issue and subsequently reporting of statistics to FAO improved.

His outspokenness at first raised the ire of many other scientists. His ability to call it like it is – often before anyone else – has been sometimes confused with egoism. But Pauly's ability to ask big questions, and then to work with his team of colleagues to reveal the answers repeatedly proven him right. Pauly hastens to point out that it is the varied skills of the scientists that make up his team - an extended family of sorts - that makes what he does possible. He is the front man, venturing out on a tightrope across the abyss, with his staff working with him to build the bridge, which allows others to come after him and see what he has seen.

With his academic respect, outgoing nature, and deep commitment to improving fisheries management before it's too late, Pauly is an outspoken advocate of marine conservation. Recently, he explains, fish had de-facto marine protected areas, places that were too far out to sea, too deep, and too difficult to access, so the fish could hide. But technology has stripped that away. "If you want to keep a population going, you have to limit the area where it interbreeds," he says. But achieving this type of protection goes against the long-established principle of open access and subsidies in the ocean – a clash that often results in devastating gridlock. "Gridlock means more of the same," says Pauly. "That means you grind down further. You lose one species after the other."

In Pauly's view, scientists working on environment related issues have been too meek. Managers, lobbyists and politicians have challenged or contorted the results of their work. Pauly's acceptance speech for the International COSMOS prize, Pauly declared, "The main reason we have used to silence us is the notion that an engagement of the environment would compromise our scientific objectivity. Yet this argument is never invoked in medicine. Indeed passive engagement for the patients against disease causing agents is not only the norm, but an essential element of doctors' professional ethics."

In his own, outstanding career and in his encouragement of his scientific colleagues, Pauly embodies and instills these ethics. As the Director of the University of British Columbia Fisheries Centre, Pauly leads a flourishing cadre of top fisheries scientists to produce ground breaking research, but equally important, he teaches young scientists that doing world class science is not enough. Scientists must communicate the implications of their work to the wider world through journalists, policy makers and the public. "We came here to make a difference," said C. Alder, a research fellow at the Fisheries Centre in an interview with the *New York Times*. "If you want to stir the pot, he'll hand you the spoon."

Thanks to Nancy Baron for her contributions to this Ocean Voices piece.