

Symposium whale zone 02

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Whales, dolphins, fishes, humans – have the oceans become too small?

First of all I would like to express my warm gratitude to the organisers of this symposium for having invited me to Rüşchlikon, and for providing me with the opportunity of discussing the subject of interactions between cetaceans and fisheries. This is a topic that should be of great concern to anyone who is interested in the protection and conservation of all aspects of our environment, including populations of whales which may be found on the other side of our planet. And I think it is particularly significant and fortunate that we are having this discussion on the conservation of marine animals in landlocked Switzerland, because this circumstance helps making the point that we are all citizens of a planet that has whales on it. This capability of participating all together in a world-wide concern for the status of our world and of its inhabitants is perhaps one of the best sides of globalisation, which should be cultivated and cherished.

My talk today is about cetaceans and fisheries, and the difficult relationship between cetaceans and fisheries in the world. All species of cetaceans are affected by fisheries in a way or the other, and therefore I will be including both whales and dolphins in my discussion, as needed, in spite of the fact that today was declared “dolphin day” in this symposium. Since the problem is quite complex and diverse, I will have to be selective. First, I will briefly try to give an idea of what is the global status of fisheries and what are the problems that affect this part of human activities in the world’s oceans. We will see that there are big problems, as you may know already. We will also try to identify the causes of these problems and what are the responsibilities involved. Then from there we will try to see how these numerous problems also affect whales and dolphins, in different, but fundamental ways. Finally, to be pragmatic and of course optimistic (we must never give up!), we will see what can and should be done to contribute to improving this situation.

So let’s start with this rather grim view of the situation of the fisheries and fish populations in the world. There has been quite a bit of analyses at the global scale recently, namely by the Food and Agricultural Organisation of the United Nations (FAO), but also from a number of independent scientists, which have thrown in the face of the world the sad but undisputable truth that fish stocks are dwindling globally. An example is given by the study published on the journal Science in 1997 by Botsford and colleagues, where it is stated that 44% of fish stocks are fully or heavily exploited, 16% are overexploited, 6% are depleted, while only 22% are moderately exploited, 9% under-exploited, and 3% recovering. And the trend, unfortunately, is leaning heavily in the direction of depletion. There are many bits of evidence that this is what is happening. From the 1950s to this day, the per capita availability of seafood on a global scale has remained constant, in spite of the growth of the human population. Coupled with the previous views on dwindling stocks, this is being achieved only through a tremendous increase of effort. However, it is an effort that is economically fuelled from the outside, from subsidies. The total cost of fisheries is much higher than their total revenues. So there is something really wrong.

There are famous examples of fish stocks that have been depleted to nothing by an unsustainable practice. The most famous is probably the case of the anchoveta in Peru, which used to be a very important fishery until about the 1950s. At that time fish began to be used to produce fish-meal for the livestock industry, and so the extraction of Peruvian anchoveta skyrocketed to 14 millions of

metric tonnes per year, becoming by far the largest fishery in the world. This was facilitated by the fact that at the same time there was a decline in the global market of fish-meal provision from traditional producers, so Peru couldn't resist the temptation of maximising such a significant source of foreign income. But soon it collapsed, and although today, after half century, the fishery still exists, it remains at very, very low levels.

Another famous example is provided by the fishery for the Atlantic cod in Canada. The beauty of this example is that there are very detailed records of the trends throughout the history of this fishery. If you look at the graph, you see a steady increase in landings of Atlantic cod in Canada in the 1800s, then the slope keeps increasing during the 1900s, until it starts very quickly to collapse during the last few decades. Now it's zero. The cod is no longer fishable in Atlantic Canada. A whole community of people is out of business. An interesting aspect of this is that at some point scientists began to advise decision makers to reduce quotas, but their warnings were ignored to yield to political pressure. Clearly the wrong decision was made, even considering merely the socio-economical aspect, given the number of jobs it has destroyed! Even more interestingly, somebody in Canada had the brilliant idea to say that it was harp seals that were to blame for the collapse of the cod; this was also very convenient, as harp seals, as we all know thanks to the vocal campaigns conducted by organisations such as IFAW, are harvested for their pelts in Canada by the hundreds of thousands. Unfortunately, as eloquently demonstrated, among others, by Canadian marine zoologist David Lavigne, this was not true. Yet in this way the attention was diverted from the real cause of the problem, precious time was lost, and the cod is now gone. We'll see in a moment how this sinister scapegoat expedient is cropping out again, unfortunately on a much grander scale, with whales in Japan. Are we so incapable to learn from past experience?

To continue with striking examples of fish stocks depletion, I must recall the study conducted by Daniel Pauly and his group in Vancouver, Canada, who have documented the decline of table-fish on both sides of the North-Atlantic over the past century. Their maps are astounding: from 1900 to 1950 to now you see the fish literally disappear under your eyes.

Change, however, does not only involve the mere disappearance with time of biomass from a fish population. There are more subtle effects that are causing great concern. One is that catches may select for particular traits in a population – most notably, size – so that in the long term the population changes. In some fish stocks it is now apparent that the smaller adult sizes have been favoured by this inadvertent, unnatural selection. Another effect of unsustainable fishing goes with the name of “fishing down the marine food-web”. This is again the work by Daniel Pauly in Vancouver. The most precious, valuable fishes, the predators such as tuna, swordfish, grouper, snapper, bass, etc., are coveted by the fishing industry because they yield the greatest revenue. As soon as these become depleted, the fisheries start to increasingly target herbivore fish species. This is very clear on a diagram Pauly has shown in a Science article he has authored with his colleagues. What happens when also the herbivore fishes are depleted is easy to imagine: the ecosystem is taken over by predatory invertebrates such jelly-fish and ctenophores – something that has happened already in the Black Sea with the help of an alien invader from the North Atlantic.

But why are we blindly heading towards collapse, in the face of every logical reasoning, something that everyone, including fishermen, environmentalists and politicians all together, should strive to avoid? The reasons are many: (a) fishery policies have been largely ineffective and improperly enforced, (b) a large part of fishery activities is illegal, unregulated or unreported, and (c) in the mean time, the marine environment is degrading because of other human activities, something which adds significantly to the problem.

Fishery policies. Why are fishery policies so largely unsuccessful? The problem is built-in the political system. In most cases, politicians who make decisions on fishery matters represent fishing communities. If their goal were to ultimately protect jobs and a professional tradition, under present circumstances they should keep to a long-term perspective and boldly undertake in the short term an uphill battle fraught with unpopular choices. Unfortunately, this is not how politics work.

This is why decision makers first pay scientists to get recommendations, and then regularly ignore such recommendations because they are so inevitably unpopular. Recently, a relevant effort to counteract this unfortunate state of things is being undertaken by the European Commission¹. It is the backbone of the new E.U. Common Fishery Policy which Commissioner Frantz Fischler is working on. As New Scientist recently put it, “the plans are to hand the control of fisheries out of the politicians’ hands into committees of faceless bureaucrats” hoping that in this way it will be easier to deal with the thorny problem. Plans also involve drastic cuts in fishing fleets and to use resources that were allocated to vessels to reduce the labour force and help fishermen find new jobs. Subsidies to fishermen are another important issue, because they help them in the short time, but slowly cause their agony. The reason is simple. Consider a natural environment in which there is a prey and its predator. If prey numbers decline for whatever reason, so do eventually predator numbers. A number of classical ecological studies have demonstrated how the number of prey controls the predators’ population. With a decline in predators’ numbers, and ensuing decline in predation pressure, prey numbers climb again, and so on. Now consider a fisheries situation, in which we have – just like in the above example – a prey (the fish stock) and a predator (the fishing fleet targeting that specific stock). Under “natural” conditions the fishing effort should remain tuned by the abundance of prey, and decline as the prey declines and as fishing becomes less profitable. Subsidies break this balance, because they are external resources that allow fishermen not only to survive in spite of the decline of fish stocks, but even to increase their effort in the face of collapse. In other words, subsidies exist to pay fishermen to fish out the last fish. This is clearly insane. We all agree that fishermen should be supported, but not in this demential way. Subsidies should only be used to encourage and assist employment outside fisheries, because the fishing force is clearly oversized with respect to fish stocks. This would help remaining fishermen to earn a decent, sustainable living, while at the same time preserving their priceless working traditions.

Illegal, unregulated and unreported fisheries. As we have seen, fisheries operating in the most populated and industrialised areas of Europe, America and Asia are reaching, one after the other, the point of collapse. This has helped the development of large “distant” fishing fleet, that many countries are sending to remote fishing grounds where controls do not exist and where overfishing is still a possibility. This is yet another way for rich countries to export their problems away from their national boundaries, and transform them in global problems while at the same time increasing somebody else’s poverty.

Environmental problems. In addition to the direct damage humanity causes to fish stocks, by subtracting fish biomass from the sea and permanently modifying the genetic makeup of fish populations as well as their community structure, another major source of problems is the degradation of the marine environment brought about by human activities other than fishing. I will mention briefly here only the most important of these: (a) pollution from urban, industrial, agricultural, aquaculture waste discharged at sea; some of the organic substances introduced by such processes are very persistent, and accumulate in the food web causing extraordinary problems including reproductive impairment, sex changes, hermaphroditism, etc. (b) global climate change causing warming of the water masses and possible future major changes in circulation patterns and productivity regimes; and (c) introduction of alien species, which have demonstrated – like in the famous case of the ctenophore *Mnemiopsis leidyi* in the Black Sea – the ability of exploding demographically in a weakened environment and taking over the fish stock by destroying their larvae.

To conclude with the first part of my talk, we have seen that we are causing tremendous damage to our oceans in many ways. For the purpose of this talk, one of the most important of these concerns unsustainable fishing practices. Perhaps a large part of the problem resides in our nature of terrestrial mammals, which makes us more prone to tend to and worry about land than about the oceans. For millennia we have regarded oceans as a virtually inexhaustible repository of re-

¹ Before going to press it is worth mentioning here a major outcome from the World Summit on Sustainable Development in Johannesburg (August-September 2002), where an agreement was reached on ways to tackle the world’s fisheries crisis. The deal envisages restoring most of the major global fisheries to commercial health by 2015.

sources, sustenance, biological diversity, aesthetic values and mystery. Now, with a human population that keeps increasing at exponential rates, and with technology allowing us ever increasing power, we begin to see that this is no longer true.

Unfortunately, this condition is not only a shock for us when we realise it, it is also a great and increasing problem for a number of marine top predators, particularly cetaceans. As you well know, cetaceans are large, long-lived, slowly reproducing mammals sitting on the top of their marine food web, and they are particularly impacted by the decrease in fish resources that fishermen complain about. This is just one among the many problems that we are causing to them. These include (a) direct killing and captures of whales (by the whaling industry, notably in Japan, Norway and Iceland) and dolphins (a bit everywhere, but in increasing numbers in several developing countries); (b) habitat loss and degradation; (c) disturbance from vessel traffic, unregulated whale watching and noise; and (c) an increasing risk of colliding with vessels.

In this scenario, the problem of negative interactions with fishing activities ranks quite high. This is, as we shall see, a complex problem. First of all, cetaceans too often die entangled in fishing gear that was not intended for catching them. Second, overfishing in many cases has left too little fish for cetaceans to prey upon, so that they face starvation or extirpation from once suitable habitats. Third, believe it or not, cetaceans today are blamed for the very fact that they eat fish, and in doing so they subtract the livelihood of fishermen. This may seem outrageous to any sensible person, however at this time it is forcefully claimed in circles where important decisions are made.

By-catch. Also known as accidental capture in fishing gear, by-catch is the cause of drowning of millions of cetaceans of most species and all sizes, from the huge sperm whale to the tiny Hector's dolphin (*Cephalorhynchus hectori*), endemic to New Zealand, and presents significant conservation problems for many populations and even some species. Particularly notorious are the cases of rare species such as the vaquita (*Phocoena sinus*), endemic to the northern Gulf of California, in Mexico, the franciscana (*Pontoporia blainvillei*), limited to the coastal waters of Uruguay and northern Argentina, and the baiji (*Lipotes vexillifer*), a Chinese river dolphin, all of which are critically endangered mostly because mortality rates due to bycatch are unsustainable. However, also cetacean species that number in the hundreds of thousands raise concern for by-catch rates to which they are subjected to in particular locations of the world's oceans. These include sperm whales (*Physeter macrocephalus*) in the Mediterranean, which were decimated by Italian and French pelagic driftnets for swordfish and tuna, Dall's porpoises (*Phocaenoides dalli*) in Japanese North Pacific driftnets for salmon, and various pelagic delphinid species affected by Taiwanese driftnets for sharks, tuna and mackerel off North Australia, by pelagic trawlers off Atlantic France, and by tuna purse seining in the Eastern Tropical Pacific Ocean, that alone has killed millions of dolphins in a few years.

Prey depletion. Just by observing a population of wild cetaceans, no matter how carefully, it is extremely difficult to be able to tell at a glance whether these animals have enough to feed upon or not. Ecological regulatory mechanisms at the population level likely induce groups and individuals, in case of need, to disperse in search of food over increasingly wider areas, so what researchers are confronted with is a reduction in densities rather than the sight of starving individuals. However, it has been possible to take rare "snapshots" of the process in some occasions, like, for instance, with bottlenose dolphins off Western Greece and the North Adriatic, by documenting the presence of very skinny, almost emaciated dolphins. Behavioural budgets measured for such populations have, rather expectedly, indicated that these dolphins spend the greatest part of their time looking for food, as opposed to similar populations in different parts of the world, e.g. the Gulf of Mexico, where time is allocated in greater balance among feeding, resting, socializing and travelling. Detecting and precisely documenting the "normal" levels at which a given habitat meets a dolphin population's food requirements remains, I think, one of the greatest challenges of present conservation science.

Competition. As one can easily imagine from what I just described, the sorry status of the world's fisheries, coupled with the degraded conditions of the marine environment, is an obvious cause for increased competition for a decreasing commonly-sought resource between cetaceans and humans. Competition of this sort, and human reactions to it, are quite varied worldwide. I will here discuss two quite different aspects, one of which results in what I view as a rather legitimate – although quite unfortunate – concerned attitude of small-scale fishermen towards dolphins raiding their nets, while the other is, in my opinion, an outraging bogus devoid of scientific bases, which was devised mostly to justify the killing of whales for commercial purposes. These two aspects should be kept quite separate and addressed in very different ways.

Artisanal fishermen all over the world – and in particular in the Mediterranean – complain about the serious financial losses they incur in due to the presence and behaviour of coastal dolphins (notably bottlenose dolphins) in the waters in which they operate. Although at times it is exaggerated, the problem here is real. Operations are small-scale, often economically marginal, conducted by low-budgeted individuals as opposed to the industrial fisheries conducted from large vessels in the open seas. Dolphins often have to compete with these fishermen for increasingly scarce prey, and when they find fish in a net they don't think twice and get it, in many cases spoiling the catch, and often causing considerable damage to the fishing gear in the process. Fishermen become understandably outraged by this, and receiving no support from the authorities that should be in charge, are encouraged to take action by themselves. ICRAM has been addressing this problem in Italy, and is able to provide some of the few data existing on this topic. Giancarlo Lauriano has investigated now for some years the interactions between fishermen and bottlenose dolphins in the coastal waters of the Asinara Island National Park in Sardinia, where a limited fishing effort is allowed. Here, quite interestingly, interactions occur only in a short period of the year, September-October, and that's when the fishermen set their nets specifically to catch high-prized red striped mullets. According to Lauriano's calculations, the mean loss per fisherman per season (i.e. year) is in the order of 650 €. One would think that that is not so much after all, also considering that the fishermen have the exclusive privilege of being allowed to set their nets in protected waters, where, in theory at least, there is more fish than in the surrounding, non-protected sea - and where dolphins should have at the very least the right to feed! And even if this were not the case, providing the fishermen with some sort of compensation just for the mere reason that they are operating in waters where dolphins thrive, would perhaps not be such an insurmountable financial feat for any Administration. Solutions, I believe, exist, however these must be part of a wider management plan which I am afraid has not seen the light yet anywhere. Acoustic devices to deter dolphins from approaching the nets are currently proposed by many as a panacea. I suspect that in reality it may not be as easy as pinger producers assure to keep a determined bottlenose dolphin from getting an easy lunch out of a net, and that if this feat is to be accomplished, one may have to put in the water an amount of energy sufficient to cause physical trauma to the dolphins. Approaches to solving this type of conflict should, in my opinion, be multiple: compensation schemes, technological innovation – including, but not limited to, acoustic pingers – career diversification, use of marine protected areas, all can contribute to the solution of the problem. In any event, it is indeed a problem, and support should be provided to fishermen so that they can continue their activity in a respectful and sustainable way.

A second example of a problem of competition between cetaceans and fisheries that I want to discuss here has a quite different connotation than the previous example. The Japanese have been looking for years for justifications for their continued killing of whales and dolphins; the most recent excuse they have come up with is that whales, on a global scale, are "eating humans' fish". The idea surfaced some years ago, when two government scientists, Ohsumi and Tamura, stated in never published papers that, according to their calculations, cetaceans would consume globally between 249 and 435 million tonnes of fish, thus dwarfing the total yield of 87 million tonnes of human fisheries. This line of reasoning, which as we'll see shortly is deeply flawed, was later picked up by Komatsu and Miyake, two government officials heavily involved in the national pro-whaling lobby, who carried the matter further in their libel "The truth behind the whaling dispute". Here Komatsu and Miyake endeavour to present their readership with the following simple syllogism: (1)

whales eat from 280 to 500 million tonnes of fish every year (a sensibly increased figure compared to the already flawed figure of Ohsumi and Tamura); (2) The natural growth-rate of whales is known to be 4% per year; this means that the whale population around the world has nearly doubled since the 1986 whaling moratorium; (3) the Japanese annual catch of fish has halved from its peak of 12 million tonnes in the 1970s to 6.4 in 1998; (4) so while the whale population doubled, the Japanese fisheries halved; (5) ergo, “whales eat our fish”. Of course if you don’t look carefully at the hard facts you may be fooled to be impressed by the figures given by the Japanese, and this is in fact what is happening in those circles in which it is more convenient to espouse theories which justify past and current mismanagement rather than rely on sound science. This is why we fully concur with Sidney Holt, who wrote: “Were it not that these claims appear to be taken seriously by some, notably by the Commissioners to the IWC from a number of Caribbean island states, one might simply leave them to be laughed out of court. But these ideas are so seductive that it is necessary to give some attention to correcting them”.

There are indeed many flaws in the Japanese contention. First, they have used population numbers that are grossly overestimated. For example for sperm whales they have assumed a total world figure of about 2 millions, although the latest estimate, by Hal Whitehead from Dalhousie University, is down to a mere 360,000. Antarctic minke whales have been assumed by the Japanese to be 760,000, an old figure provided by the Scientific Committee of the IWC, however the updated figure is about half of that; and so on. Second, the Japanese have assumed that cetaceans are experiencing a yearly population increase of 4% worldwide, which is far from real. Although it is true that some whale populations, that were heavily exploited decades ago, are now recovering at a heartening rate (a case in point being exemplified by the southern right whale), it is also true that most populations have at best zero growth, while some, unfortunately, are even decreasing. Third, the Japanese have estimated consumption rates based on very crude assumptions, that do not take into account critical causes for variability such as the differences in caloric content of the different prey types, the age structure of the cetacean populations, and the huge disparity in body mass between the adult sexes of several species. Fourth, and most important, the Japanese oversimplify marine food webs by suggesting that if you remove a fish predator from the ocean you will automatically make more fish available to fishermen. This view may be seen as insulting to even a first-year ecology student, who knows well how much more complex is the real world, and that the intricate connections between the different food web components in an ocean ecosystem demand a rather more sophisticated approach to even attempt a prediction.

And finally, of course, comes the question: if it were true that it is whales that eat “our” fish, why was this problem not evident one hundred years ago, when – in pre-industrial whaling days – there were two orders of magnitude more whales swimming around in the world’s oceans? Or is it not more likely that it was systematic mismanagement that has globally reduced fish stocks – we’ve seen that there is ample evidence of that – and now it is so much more convenient to claim that it is all because of the whales, so that we must cull them to protect “our” fishes? Unfortunately, when political agendas are being pursued with the support of false science, there is no limit to criminal action. Trying to conceal that “our” fishes need to be protected first of all from our own actions is, in my view, one of such crimes.

The difficult part of all this discussion comes when we ask ourselves the question: “what can be done?”. There are, I think, several possibilities. One is that we do nothing. We continue like now, with fish stocks decreasing and eventually become extirpated, the same sort applying to top predators – cetaceans included - which also depend on such stocks for their living. In this case, the problem will become solved by itself, because fisheries will also be forced to disappear in due course, as it has happened for example with the Atlantic cod in Canada. However, it would be insane to advocate to proceed in this direction - the one in which we are actually heading - which is certain to bring about a great deal of environmental impoverishment and instability, social suffering, and uncertainty about what new equilibrium will eventually develop. Another possibility is that we, as voters, induce our politicians to do something serious about this situation. This is of course what should be done in the first place and should have been done since the beginning. Unfortunately, as we have seen, it never worked well given that in most politicians’ ears the voice of the

fishermen demanding short-term benefits to the detriment of the long-term has always been the loudest. And then there is a third possibility, which is complementary, rather than conflicting, with the second. Not only can we act as citizens and work on our politicians. We can also act as consumers, and in this way we have an incredible power because we can work on market forces. I am not going to elaborate further on this topic because it will be the subject of the talk immediately after mine, which will be given to you by Paolo Bray who knows a lot about it.

I would like now to conclude by returning to the question that I posed at the very beginning of my talk. The question was: "are the oceans becoming too small?". I don't think that they are, as much as they may look like they are. I think that the oceans could still be very large and rich if we were to learn to use them properly. But to accomplish this we have to change our attitude towards one of greater respect and care. And I am personally convinced that we have the moral obligation to do so, for the simple reason that we can do it.