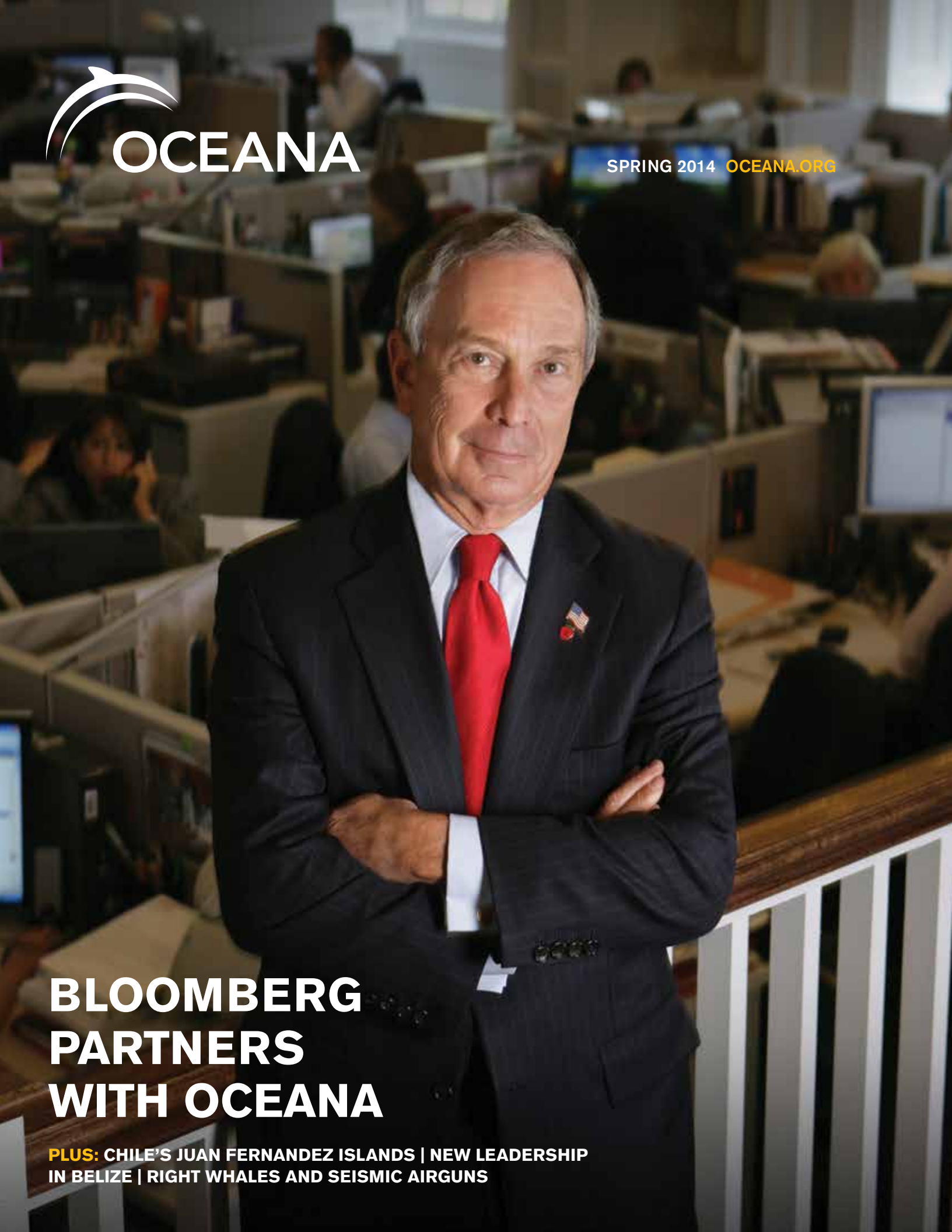

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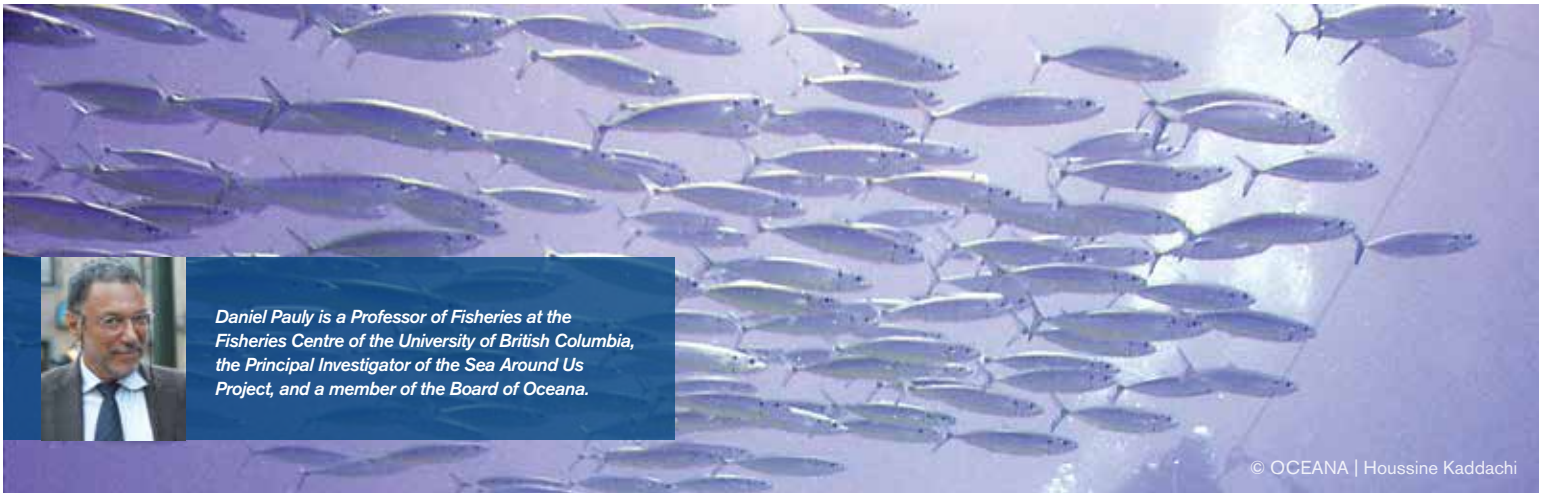

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ASK DR. PAULY

What is maximum sustainable yield?

Maximum sustainable yield (or MSY) is the maximum catch that can be extracted from a fish or other population *in the long term.* Thus, given that the term was coined before WWII, one could say that fisheries scientists thought about sustainability way before it became fashionable, but they did not have sustainability in mind. (See sidebar.) And since the term is old, lots of people, including fisheries scientists, now think that MSY is an obsolete concept, or even a misleading one. But I don't agree: it's an extremely useful tool, but like all tools it can be misused.

A well-justified use of this tool is at the conceptual level, where it comes in handy to explain the basic elements of fishery science to students: if you do not exploit it, a fish population will tend to be high (and catches are zero), that when you fish it moderately, this population will first decline, but then stabilize at some intermediate level (and generate a high catch), and that when you fish excessively, the population and the catch will crash. The point is to fish moderately, or just right.

In practice, it has been realized for most fisheries that fishing "just right" cannot involve a fixed, unchanging MSY, but must use a Total Allowable Catch (TAC) which must be set annually by fisheries managers. The TAC allows for fishing "just right" in the face of natural fluctuations of the environment, which induce natural fluctuations in the size of fish populations.

Fishing "just right" can be undermined, however, by lobbying, when fishing enterprises are allowed to maintain their operations and profits by exploiting a species whose abundance is so reduced that it shouldn't be fished, and should be allowed to recover instead.

Thus, in contrast to the widespread belief that the MSY concept is dead (a well-known fisheries scientist once wrote in an "Epitaph to MSY"), the concept is a very much alive and kicking, and is the bedrock of many stock assessment models that are used to set TACs or "quotas" in fisheries throughout the world.

The MSY concept is also an important component of the United Nations Law of the Sea (UNCLOS). UNCLOS requires countries with Exclusive Economic Zones, or EEZs, (essentially all maritime countries of the world) to assess their fish stocks relative to their MSY and to allow interested countries with distant-water fleets access to their EEZ if they have a "surplus," meaning if they do not exploit their fisheries resources at MSY level. Indeed, this is one reason why poor countries, like those in fish-rich West Africa, or in the tuna-rich Pacific find it difficult to resist when distant-water fleets from the EU, Eastern Europe, or East Asia knock at their door. That they get a pittance for their fish (usually between one and five percent of their value at first sale) doesn't protect them—under UNCLOS, they must let other countries take their fish because they don't fish "at MSY."

Thus, the MSY is here to stay (at least for a while), and we will have to get used to its Janus-like nature as both a rigorous and useful scientific concept and as an instrument of power politics.

THE ORIGINS OF MSY

While there is good science behind the MSY concept, the term itself appears to be a post-WWII invention of the scientist-turned-politician Wilbert Chapman, of the University of Washington and later with the US Department of State. He used MSY to argue that Latin American countries, like Peru and Costa Rica, should allow U.S. tuna vessels to access the surplus in their waters, while simultaneously denying Japan permission to fish in Alaska, because of its alleged lack of a surplus. The saddest part of this cynical game is that when Chapman published his version of a "surplus-production model," he got it all wrong and could not actually compute anything. This is all neatly explained in an excellent little book by Carmel Findlay, entitled *All the Fish in the Sea: Maximum Sustainable Yield and the Failure of Fisheries Management* (University of Chicago Press, 2011).