

TOWARD A CONSERVATION ETHIC FOR THE SEA: STEPS IN A PERSONAL AND INTELLECTUAL ODYSSEY¹

TEXT OF THE KEYNOTE PRESENTATION TO THE FIRST INTERNATIONAL
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I grew up in La Chaux-de-Fonds, a little town in the French-speaking part of Switzerland, in the Jura mountains, where cows roam freely, but not very far because they have bells. I did not have a “normal” youth,² but I did have hamsters, a goldfish, and sometimes a dog. Having said that, I did not have the intimate connections with nature that some well-known biologists enjoyed. I was into books and ideas, never a naturalist. I tend to see patterns in data,³ but not in raw nature.

At 16, I dropped out of high school and went to work in Germany for one year as a “diaconic helper” in an asylum run by the Lutheran Church and in a hospital, which cured me forever of the religious delusions common in juveniles. Instead, I realized that I needed to go back to school, and this I did: for four years, I attended evening school from 5 to 9 pm, five times a week, while working in factories during the days to support myself. Nature, never in the foreground, receded even further into the background of my life.

Then, in the spring of 1969, I graduated and went to the US to connect for the first time with my father and his family, much as I had reconnected with my mother and her family three years before in Paris. While, as the son of a French woman and African-American GI, I was previously aware of being biracial (and there was always somebody to remind you, lest you forgot), I was not really ready to be part of a group. In the US, I became assimilated into one (“African Americans”) that was still engaged in the fight for civil rights and its various ramifications.⁴ I came out of this experience more confused than ever, but convinced that I should somehow join in the struggle of people of color. I couldn’t live in Europe anymore.

Thus, when I began my studies at Kiel University, I aimed to learn something “useful,” i.e., something that would enable me to work in developing countries. I obtained permission to do a double major in biology and agronomy, but unreformed old Nazi professors (real, not metaphoric ones!) drove me out of agronomy. Also, they deni-

1 This is a lightly edited, but heavily referenced version of the notes used for the keynote address I gave at the First International Marine Conservation Congress at the Smithsonian Institution National Museum of Natural History in Washington, DC on May 19, 2009. A video of the keynote is available at http://www.youtube.com/watch?v=A24n-HQ8sLg&feature=player_embedded.

2 See, e.g., Malakoff (2002).

3 Two recent books document this (Pauly 2010a,b).

4 Notably, I connected with my cousin, Edward Whitfield, who was just recovering from the notoriety he acquired due to the armed takeover, by a group he led, of part of the Cornell University campus, and which put him, among others, on the cover of *Life* and *Newsweek* magazines (see also Dunbar 1991, Kirkpatrick 2009).

grated and lied about Rachel Carson and her book, *Silent Spring*, which I had just read.⁵

Marine science offered an alternative mix of useful and neat science, and Kiel University was a good place for it: you could learn classical fisheries science and marine biology at the very same place where Victor Hansen and Karl Möbius, in the late 19th century, founded planktology and community ecology, respectively. The courses available were a nice combination of theory and practice, i.e., laboratory and at-sea work, the latter being my first real introduction to the marine realm. The fisheries work was conceptually easy: we were to study and understand the resource species, so they could be “managed.” There were “managers” somewhere who would use our results to get the most out of the resources in continuous fashion.

Here are two things that impressed me during my studies: firstly, my six months (in 1971) in Ghana to study a coastal lagoon, near the port of Tema. I learned all about the little lagoon,⁶ which supported an artisanal fishery for blackchin tilapia.⁷ Now 30 years later, the lagoon is inside Tema, and the tilapias, size-wise, have turned into guppies. It is also then that I got my first sunburn, and learned that I was European, not “African.” Secondly, my six weeks (in 1973) onboard a giant factory ship turned research vessel, monitoring the cod stock off Newfoundland and Labrador. These were the heydays of the cod fishery (which collapsed less than two decades later). We were fishing at 500 m depth, with trawls capable of lifting a boulder the size of a Volkswagen. Now, I can appreciate the irony: we didn’t know what we were doing.⁸

In 1974, I obtained the German equivalent of a Master’s degree,⁹ and I was hired by the German International Development Agency (GTZ) to work in Tanzania. I learned about Indian Ocean fish in a Frankfurt museum, and sat through four months of Swahili, enough to hold a simple conversation. Then, in mid-1975, I was shipped to Indonesia to help introduce trawling to the country.

In Indonesia, I did the standard work of foreign fisheries “experts” working in developing countries, i.e., helping to “develop” fisheries. This consisted mainly of conducting surveys to estimate the then largely unexploited demersal fish biomass of western Indonesia, then writing reports about how much was there, and how much could be taken.¹⁰ I later realized that the people acting on this were the staff of development banks, who used our estimates of “potential yields” (i.e., “possibly maximum sustainable yield, but be careful”) to justify loans to countries from which vast trawler fleets were purchased.¹¹

5 My disgust about the shabby, character-assassinating treatment of Rachel Carson and her work (*Der stumme Frühling*, 1964) was, so far as I recall, my first stirring of environmental awareness.

6 See Pauly (1975), and Pauly (2002).

7 See Pauly (1976), and references therein.

8 The collapse of Northern cod, supposedly the best managed in the world, is discussed in Walters and Maguire (1996).

9 This was called a “Diplom;” there was, at the time, no equivalent to the Bachelor degree in Germany, and indeed, most of Europe.

10 With an Indonesian colleague, I later edited our and similar reports into a book (Pauly and Marto-subroto 1996) to prevent the data loss and ensuing lack of baseline data which often followed these costly surveys (Zeller et al. 2005); this concern with lost and/or inaccessible data is also what led to the creation of FishBase (www.fishbase.org).

11 They should have purchased a few vessels and seen how they performed. If profitable, these trawlers would have generated the capital needed for the purchase of next vessels, etc., until the fleet size was appropriate for the then reduced size of what would have become an exploited resource. This approach would have required only a small subsidy (for the initial vessels). Instead, the Manila-based Asian Development Bank invested over US\$1 billion into the subsidization of trawler purchases and similar fisheries developments (Mannan 1997), and the resulting huge fleets quickly collapsed the stocks throughout the region. Thus, in 1980, the Indonesian government had to ban trawling in the western half of the country, where this misguided development had occurred (Bailey 1997).

They used our potential yield estimates (which, with hindsight, were far too high), but did not care about their sustainability (the word wasn't used then) or about the ecosystem impact of fishing ("ecosystems" did not exist then for fisheries science). On the ground, however, we were transforming the coastal ecosystem from a soft coral system to a muddy bottom system. Of the many scientific challenges at the time, three now stick out: (1) we were terraforming the sea (but did not know it); (2) we were ignoring small-scale fishers (but did not care);¹² and (3) we were dealing with more species than we could handle.

I chose the last of these problems as my research challenge. The two years in Indonesia passed quickly, and I then returned to Germany with my head full of things to do to improve fish stock assessments in the tropics. Indeed, I got a PhD working out some of these concepts,¹³ and also teamed up with colleagues who helped me program some of the more outlandish ideas; for example, a software called ELEFAN for estimation of growth from size-frequency data, which worked on microcomputers¹⁴ such as the Apple II, then fresh from Steve Job's and Steve Wozniak's garage.

In 1979, I was back in southeast Asia, this time in the Philippines, at the International Centre for Living Aquatic Resource Management (ICLARM).¹⁵ This institution, founded two years earlier by the Rockefeller Foundation, was to do for the ocean what the Green Revolution had done for the land (increasing yields, the panacea these days). For me, this meant teaching my newly-developed methods and concepts as tools of "empowerment" throughout the tropical world.¹⁶ Thus, I got to know hundreds of colleagues on five continents, and found out that they all had similar concerns.

Travelling, as I did, and crossing cultures and languages helped me see similarities where others saw differences. Thus, in the 1980s, the artisanal fisheries of Senegal, in northwest Africa, were booming and a source of wealth,¹⁷ and those of the Philippines were already in a pit,¹⁸ but I understood, contrary to many anthropologists, that it was not due to differences in their social organization, or Asianness versus Africanness, but to contingencies of development, i.e., when did it start? Now, Senegalese fisheries are in the same pit as those in the Philippines. This required a theoretical explanation, which I endeavored to develop,¹⁹ and which brings us to our first digression.

DIGRESSION:

A SCIENTIFIC REVOLUTION IN THE 1980s–1990s

Just as the marine sciences were transformed by the theory of plate tectonics in the 1960s, which provided powerful explanation for a number of geological and biogeo-

12 It is still the case that small-scale fishers are largely ignored by national and international development agencies (see Pauly 2006), which is made worse by their often sizeable catches and contribution to food security being underestimated by these same agencies (see, e.g., Zeller et al. 2007a, 2007b).

13 Pauly (1981), updated and expanded in Pauly (2010b).

14 See Pauly (1998) for a review of these techniques.

15 This was my reward for having written, during a 3-month consultancy the year before, a report outlining what this new institution should do regarding marine fisheries research in the tropics in general, and in Southeast Asia in particular (Pauly 1979).

16 My colleagues and I made a point of requiring participants of these training courses to write papers embodying what they had learned; see, e.g., Venema et al. (1988), Pauly (1986, 1992).

17 See contributions in Chavance et al. (2004).

18 See Pauly and Chua (1988).

19 See Pauly (2006).

graphical phenomena,²⁰ anthropology was revolutionized by the realization, in the 1980s–1990s, that we are a modern species, only 100,000 to 200,000 years old,²¹ not derived from the various hominid species outside of Africa (e.g., the Neanderthals).²²

Moreover, we now have good evidence that all non-Africans alive today are the descendants of a single, small (< 1000) group of humans that left Africa for Asia by crossing into what is now Yemen about 70,000 years ago.²³ These migrants out of Africa had all the mental equipment which enabled them to gradually people the whole world and later overwhelm it. Thus, all humans are closely related and only recently separated, such that even the identification of features of an ancestral common language can be envisaged,²⁴ not to mention the many initiatives documenting our genetic affinities.²⁵

The take-home message is simply that there is a good scientific basis for assuming that we are similar and react to similar challenges in a similar fashion. This is obviously the basis for evolutionary psychology²⁶ and other initiatives to put the various social sciences on a solid Darwinian basis.²⁷

Now: what is it that people do? Or what is our niche? Bill Rees of the University of British Columbia (UBC) and others define our species as “patch disturbers.”²⁸ We mess up a place, and then move on. Elephants do this as well, and where there are too many of them, they will reduce the vegetation covering and overall biodiversity in a place, just as we do.²⁹

But we are not elephants. Indeed, for a long time, our pre-human ancestors were simply one of the many prey on which the great cats and other predators relied; we were then truly, as the otherwise meaningless phrase goes, “part of the ecosystem.”³⁰ But we had those big brains, and we planned and did things in groups and, gradually, we ceased to be the prey and became serious competitors for the great carnivores.³¹

As we hugged coastlines, our main initial routes of expansion,³² we gradually peopled the world, even the Americas, through the kelp highway, as new scholarship suggests,³³ and finally built the sophisticated boats that enabled the peopling of Polynesia.³⁴

We wiped out all of the big herbivores we could access: the large marsupials in Australia 50,000 years ago,³⁵ right upon our arrival there, mammoths in Eurasia about 20,000 years ago,³⁶ 40 or so species of large mammals in North America about 10,000 years ago,³⁷ and the 11 species of moas in New Zealand, also right after arrival of the first Polynesians.³⁸ There is a huge amount of debate about this, mainly

20 See contribution in Oreske (2001).

21 See Mcdougall et al. (2005) and references therein.

22 While we may have exchanged genes with Neanderthals (Dalton 2010), we (*Homo sapiens*) are not descended from them.

23 See Manica et al. (2007) and Oppenheimer (2009) for a review.

24 See http://en.wikipedia.org/wiki/Proto-Human_language.

25 See, e.g., the Genographic Project of National Geographic, and Wells (2002).

26 See contributions in Barkow et al. (1992).

27 Steven Pinker's *Blank Slate* (2002) is an excellent entry point into this literature.

28 Rees (2002).

29 See, e.g., Lombard et al. (2001).

30 See, e.g., Hart and Sussman. (2009).

31 See Treves and Noughton-Treves (1999) and references therein.

32 See Oppenheimer (2009), Wells (2002).

33 Erlandson et al. (2007).

34 See Gibbons (2001) on the peopling of Oceania.

35 Flannery (2002).

36 Nogués-Bravo et al. (2008).

37 See Alroy's (2001) test of PS Martin's Pleistocene “overkill hypothesis.”

38 Flannery (2002).

because the notion of ancient people having such destructive power doesn't sit well with everyone.

Then we began what I think is definitely our move out of the (natural) ecosystem: about 10,000 years ago, we began farming, and the hunter-gatherers throughout the world began their long decline into marginalization.³⁹ No more patch disturbing? Not so: rather than going after the large animals that lived off the land, it is after the land that we went.

I'm here referring to David Montgomery's excellent book, *Dirt: the Erosion of Civilizations*, which demonstrates that every succeeding civilization derived its power from the fertility, hence the soils, of its core region. Whether we are looking at the Babylonians, the Hittites, or the Romans, their hegemony lasted only a few hundred years, as long as it took for their soils to be ruined.⁴⁰

The apparent exception to this sad story is Ancient Egypt, which lasted millennia, but whose soil was replaced every year by the Nile. Needless to say, this had to be gotten rid of. Now, with the Aswan Dam, we can expect Egypt to go the way of Babylon.⁴¹

BACK TO THE 1990s

In the 1990s, we had an administrative mess at ICLARM (the longevity of research institutions may also be inherently limited) and I was offered a position at UBC. But, I asked myself, should I go on researching and teaching fish population dynamics and ELEFAN, and other nifty little tricks? No: my kind of simple-minded work was too unsophisticated for North America (where we make sophisticated messes), and I had drawn the consequences from the cod collapse: North Americans don't know what they are doing either and the political system, if not prodded, won't do anything. I found it was similar, after all, to the situation in developing countries, where the colleges that I taught at had no influence on decision-making in fisheries, making development cum management a parody.

But in the Philippines, I had also lived through the People Power Revolution which overthrew the conjugal dictatorship of Ferdinand and Imelda ("she-of-the-shoes") Marcos in 1986, confirming something I also saw in May, 1968 in Paris: people can force government and their agencies to do what they don't want to do (because they have been captured by industry lobbyists).⁴²

So, at one of the first fisheries meetings I went to in my new position,⁴³ I offered my services to a group of baffled representatives of environmental NGOs, huddling among themselves instead of working the crowds.⁴⁴ This led me to participate with WWF in the work leading to the creation of the Marine Stewardship Council (MSC),⁴⁵ and to begin a series of public lectures that have taken me to all corners of the US, Canada, and other countries and continents.

39 Brody (2001).

40 Montgomery (2007).

41 White (2010).

42 The "capture" of government agencies by the industries they are supposed to regulate is a phenomenon well studied in the sociological literature; see Martimort (1999) and references therein.

43 The 1995 American Fisheries Society Annual Meeting, held in Tampa, Florida.

44 The group, I seem to recall, included Mike Sutton, then with WWF (and later to help launch the MSC), and Carl Safina, among others.

45 The irony is that I am now quite critical of the MSC, which also appears to have been "captured" (see Jacquet et al. 2010).

This is also the time when I was lucky enough to publish a series of papers which had a certain success, notably a concept paper on “shifting baselines” and “fishing down marine food webs.”⁴⁶ In 1998, the Pew Charitable Trusts invited me to Philadelphia. There, I joined a small group of marine scientists who were asked to respond in a one-day workshop to the question of how they would assess the health of the ocean. They all said that “ocean health” is not a scientific concept, and that they would need more data (incidentally: this is the kind of thing which causes people to think scientists are useless). I proposed instead that the world marine fisheries statistics of FAO could be seen as a huge sampling program, conducted over all oceans for almost five decades, and that we should first analyze it. I carried the day.⁴⁷

Thus, at UBC, I began to assemble a brilliant group of people (Villy Christensen, Rashid Sumaila, Reg Watson, Deng Palomares, Dirk Zeller, and others) and design a project called the Sea Around Us, named after Rachel Carson’s last book, to document the state of the oceans and to work with civil society to help slow down or reverse negative trends.⁴⁸

One of our first visible results was an analysis of world catch trends which demonstrated that the world catch was declining, as could be inferred by negative stories everywhere, but that this had been masked for years by catch over-reporting by China.⁴⁹

This came at about the same time that Jeremy Jackson and his colleagues were showing that overfishing had been the *modus operandi* for millennia,⁵⁰ and also at the same time that papers of the late Ransom Myers were hitting the news.⁵¹

Jointly, these papers changed the view that fisheries are isolated affairs, failing separately from each other. Rather, there is now the realization that our entire mode of interaction with the sea is wrong; just like we don’t believe any more that this or that bank failed, but that the whole financial system failed us.⁵²

PRESENT TRENDS

Over the years, we have made more maps showing fisheries as a global system, and we came to realize that the old patch disturber has now almost completely disturbed the biggest patch on Earth, the oceans, through three expansions: (1) geographic, from the north to the south; (2) bathymetric, from shallow to deep waters; (3) taxonomic, into new species we didn’t eat before.

And we realized that we almost never had real sustainability, as demonstrated by a given group of humans maintaining (or even coexisting with) an animal population, despite their ability to deplete it.⁵³ We had even less of that oxymoronic concept, “sustainable development.”⁵⁴

46 Five of these papers are reprinted in Pauly (2010a).

47 Malakoff (2002).

48 Pauly (2007a).

49 Watson and Pauly (2001), reprinted in Pauly (2010b).

50 Jackson et al. (2001).

51 See Pauly (2007b).

52 This point is elaborated upon in Pauly (2009a,b).

53 The strange-looking definition is used here to counter the notion that the long coexistence of certain desirable species with human groups *ipso facto* implies that the latter had (and acted on) a sustainability ethic. In fact, the notion that our ancestors or predecessors were ecologically conscious guardians of the Earth is a myth, as evidenced by Flannery (2002) and Krech (1999), notwithstanding early hunters’ deep connectedness with nature. Rather, they exterminated what they could (see, e.g., Alroy 2001), given their population density and tastes (for meat, fur, feathers, etc.), and the resulting hunting pressure. One could therefore argue that giraffes are presently one of the few species whose population is “sustainable,” in the sense that they persist only because those humans prevail (at least for the time) who want them to. However, it is very easy to imagine an alternative configuration, in which giraffes are hunted down (and very profitably so) to the last individual. Now try the same thought experiments with rats or cockroaches.

54 See Frazier (1997).

Indeed, the world of fisheries has been warped by the demand emanating from a few markets (the EU, the US, Japan, China), all with devastated local stocks and insatiable appetites. In Europe and North America, we not only want to eat all the fish, but we also pick and choose sustainable fish from magic wallet cards so that we can feel good about ourselves. The MSC, in a move similar to Anakin Skywalker's, is certifying reduction fisheries; in other words, certifying as "sustainable" the grinding up of perfectly edible fish to make fishmeal so pigs can eat fish, and so an ever increasing tonnage of farmed salmon can be certified as "sustainable," because they are fed with certified anchovies.⁵⁵ This is old patch disturber again, this time wrecking even the very language with which we think and express ourselves.

Clearly, we now consider the entire planet a patch that we can disturb and then move on, though many science fiction authors suggest that we will do just that, if we can. Lester Brown has a beautiful article in *Scientific American* outlining a way to counter this with what he calls "Plan B."⁵⁶

CONCLUSION: THE NEED TO UPDATE OUR OPERATING SYSTEM

To conclude, nevertheless, on a positive note, I will briefly elaborate on the mental underpinnings of such "Plan B," using the computers as an analog to our brain (the hardware). Essentially, through our (pre-) history, we ran three successive operating systems on our computers/brains:

OS1: We-Are-Part-Of-The-World-Around-Us: this is embodied in various animist religions, i.e., we believed (or still believe) that we share with the animals, plants, and inanimate objects an essence or spirit. This emphasizes natural cycles and linkages between things, animals, and people, mediated by magic. A working system, but easily beaten by its successor;

OS2: We-Are-The-Master-Of-The-World: this is embodied in the revealed religions, i.e., a top boss (the deity) who put us in charge on Earth, which we leave when we die. We do not share essential features with inanimate object and plants, but with the deity, and use ritual and magic to communicate with it. A very robust system;

OS3: We-Know-Why-We-Are-Part-Of-The-World-Around-Us: this is the beginning of a scientific (or rational) worldview, deeply connected with the ideals of the Enlightenment (equality, human rights, and all that), but very fragile and easy to crash (see, e.g., the Nazi, or contemporary religious fanatics of various kinds).⁵⁷

The basic feature of OS3 is that it works on a set of basic beliefs that are not challenged in theory, for example, that all people on Earth are equal and should get a fair deal. This is not true in practice, but a shared belief that we use to judge practical events. This is also the foundation myth of modern democracies. Part of this foundation myth is that we should know things and that knowledge is a good thing, the basis for the peaceful coexistence of democracy and science.⁵⁸

Clearly, we will have to graft onto the fabric of democracy and of the Enlightenment itself a new set of values (also called "rights"), pertaining to our continued exist-

⁵⁵ See Jacquet et al. (2010) and Alder et al. (2008).

⁵⁶ Brown (2009).

⁵⁷ See, e.g., Hitchens (2007).

⁵⁸ This was well summarized by Overbye (2009), who rightly asserted that "Science and Democracy have always been twins."

tence on this planet. Let's call this OS3 v2.0. This will involve a right to a fair share of the planet's resources; right now, this right is being negated, mainly by corporations, and by the inhabitants of a few countries eating up all the resources. This will also include a right to learn about the world, rather than being brainwashed into belief systems that close minds.

Foremost about v2.0 is that it would always require about any new venture that we start to assess whether it is truly sustainable; i.e., independent of fossil fuel, fossil water, or consumptive of soils, or other non-renewable resources.

There is no reason why such an OS shouldn't work. Thus, I am not wholly pessimistic about the future: we have an operating system that, with an upgrade, could replace the one that is failing us. I just hope that the upgrade doesn't occur too late, before we have completely trashed our planet and our oceans.

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I thank J Jacquet for insisting that I should not, for my IMCC keynote, do a number-and-graph, PowerPoint-heavy lecture, but simply narrate my personal experience with, and my views on, marine conservation. This is a contribution of the Sea Around Us project, a scientific collaboration between the University of British Columbia and the Pew Environment Group.

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