



AS I SEE IT

Homo sapiens: cancer or parasite?

Daniel Pauly*

Fisheries Centre, University of British Columbia, Vancouver, BC, Canada

ABSTRACT: Two contrasting ideas, that humans are 'part of the ecosystem' (i.e. a constitutive element of the ecosystems they exploit) and that humans are 'a cancer on the Earth', are examined in the light of the current despoliation of the biosphere. It is concluded that neither can describe our longer-term ecological role on Earth, which, at best, will have to resemble that of a co-evolved parasite of the earth's systems.

KEY WORDS: Global ecosystem · Gaia · Parasitism · Human expansion · Fisheries

INTRODUCTION

As a fisheries scientist, I could be expected to reflect on the destruction of life in the ocean that goes along with the industrialization of fisheries. Indeed, I have done so, in numerous publications (Pauly et al. 2002, Pauly 2009a,b, 2012). This essay, however, will not be about what a detractor called 'the litany'. Rather, it is an attempt to connect 2 more fundamental memes, both of which deserve far more scrutiny than they have received so far. They are (1) the notion that we humans are 'part of the ecosystem', frequently asserted by those who try to reconcile human exploitation and the maintenance of the ecosystems in which the exploitation occurs (Rapport 2000, Pavlikakis & Tsihrintzis 2003) and (2) the notion that we humans are 'a cancer on the Earth', proposed by less Pollyannaish authors (Hern 1993, MacDougall 1996).

The first of these notions, that we are 'part of the ecosystem' is treated as a truism in the fisheries and marine conservation literature (see Charles 1995, Berkes 2004) and is reflexively evoked to dismiss schemes which propose setting up nature reserves from which all extractive activities by humans are

excluded (see, e.g. Jones 2008). This hopeful notion is obviously suffused with good intentions, as we would like to reconcile Nature with human well-being whenever possible, just as we would like to have our cake and eat it, too. But this notion, if taken seriously, prevents us from thinking of ecosystems without humans in them. For example, we ought to be able to at least conceive of a natural park in which one cannot mine, fish, hunt, or drive snowmobiles. Useful concepts should help us to think about potential scenarios, not preclude them per definitionem.

Obviously, there was a time when we were indeed very much part of ecosystems. Thus, our various ancestors in the African savannah, while chasing after antelopes armed only with pointed sticks, could themselves easily fall prey to another predator, such as a lion. In fact, in those times, human demography was largely controlled by the dynamics of their predators, along obviously with the dynamics of their food supply. In effect, our population was then controlled both from the top-down and from the bottom-up, and this resulted in our ancestors' population not being able to grow beyond the carrying capacity of the African savannah (Wells 2004, Tattersall 2009, Stringer 2011).

*Corresponding author: d.pauly@fisheries.ubc.ca

At some point though, one or several traits were acquired through natural selection and/or cultural evolution that enabled us to escape control by large predators, probably via a mixture of reciprocal altruism and/or language (Tattersall 2009), enabling collective defense (and offence). This enabled us to eliminate our carnivorous competitors and our population to grow so as to exceed the carrying capacity of the environment for hunter-gatherers (Mellars 2006). Of the 2 consequences that emerged from this, one is murderous conflicts over resources, something that has accompanied us since, although perhaps with diminishing intensity (Pinker 2011). The other was expansion out of Africa, into the rest of the world (Wells 2004, Mellars 2006, Stringer 2011).

This expansion was performed by hunter-gatherers, except for the more recent expansion into Oceania, which saw agriculturists colonizing one island after the other (Oppenheimer & Richards 2001). Whether by hunter-gatherers or agriculturists that also hunted, the expansion always had the same results: the elimination of potential predators (most large carnivores), of large prey, e.g. moas in New Zealand (Holdaway & Jacomb 2000), mammoths, mastodons, giant ground sloths and horses in North America (Alroy 2001). Another common result was the degradation of the vegetative cover, due to the absence of the cropping and fertilization by large herbivores (Zimov 2005), fires (Flannery 2002), and agriculture-induced erosion (Montgomery 2012).

The invention of agriculture made us less dependent on the fluctuating abundance and migration patterns of prey animals and on knowledge of their habits (Liebenberg 2013). Also, we modified the plants that we found in various habitats and adapted them to our requirements (Purugganan & Fuller 2009). Here again, this can be interpreted as depending more on the ecosystem since the plants we farmed were originally wild, but what this actually meant is that we could step even more out of the cycles of nature, by creating alternative systems meant to support us, and only us. Industrialization, with its use of fossil energy to produce fertilizers, and the discovery of the germ theory of disease (which led to public sanitation systems, improved personal hygiene and later to antibiotics) were further steps out of ecosystem control, into cycles meant only for us. These cycles, which eventually came to be called 'The Economy', operate within, but are not part of natural ecosystems, with which, however, they interact in multiple, pernicious ways (Davidson et al. 2014), leaving a vanishingly small fraction of Nature not grossly disrupted by the human enterprise.

ARE WE A CANCER?

This progression from humans as an undisputable part of Nature to humans destroying it through their economy (Ehrlich 2014, this Theme Section) can be seen as a frightening analog of the progression of cancer tumors in someone's body, where Nature is the 'body' (Gaia? Grimm 2003) and individual species its cell types, with multiple sets of controls previously ensuring homeostasis. (Yes, things change greatly in geological time, too, but never as fast as we impose on the earth—except for a meteor slamming into the earth, another analog to our ecological impact but not one pursued here.)

One of the 'cell types', *Homo sapiens* in this case, managed through crucial changes—e.g. the invention of language (Tattersall 2009) or collective hunting (Liebenberg 2013), or more pointy weapons—to escape these controls and proliferate, using the other 'cell types' as substrates. The literature on humans-as-cancer of the earth provides very detailed analogies (or is it homologies?) between the growth (of civilizations and) of the global economy and the growth of cancerous tumors. In fact, the close match between these 2 groups of phenomena is frightening, as is the realization when flying over any landscape that whatever human impact we notice out of the plane's window is something that has grown and will continue to grow—until when?

Most cancer cells are stupid in that they kill their host once they have lost all of the genes which, by constraining their multiplication, compelled them into functioning as part of organized tissues. One of the few exceptions here are transmissible cancers such as the one that is presently causing the Tasmanian devil population to plummet (Murchison et al. 2010). Parasites are evolutionarily smarter. They may be very infectious at first, but usually a strain will select out which can co-exist with the host and may in fact turn into a symbiont (Haldane 1949), such as the benign bacteria that protect us from other, potentially harmful bacteria (see Hanski 2014, this Theme Section).

OUR ECONOMY

Cancer cells, in contrast to parasites, become ever more virulent as a cancer progresses. Our economy is becoming more virulent as well. For centuries, it was fuelled by 'normal' returns on capital, from about 5% (Piketty 2014) to 10% per year (Morowitz 1992). The economy driven by normal profit consisted of 'real'

processes, e.g. manufacturing goods, or transporting them from sites of production to markets. However, an increasing segment of our economies are formally not distinguishable from a set of interacting Ponzi schemes (Basu 2014), characterized by huge discount rates (Sumaila & Walters 2005) and short-term profits, which negates the very idea of sustainability. This 'Ponzification', also known as the 'Wall-Street-ization' of the economy, implies that a firm capable of generating a 5 to 10% return in the long term will likely be eaten up by a financial institution seeking super-profits of 20% or more per year on the shorter term. Natural, wealth-generating processes, such as the (re-)growth of forests, or the growth of wild or domestic animal populations do not live up to these expectations (Clark 1973), which can be met, therefore (and only for a while) by liquidating assets, or through Ponzi schemes such as the one perpetrated by B. Madoff (Anon. 2014); hence, the clear-cutting of forests worldwide (Ramankutty et al. 2006), the decimation of fish populations (Pauly 2009a) and the bankruptcies (with subsequent asset-stripping) of previously profitable private and public enterprises which otherwise do not generate the super-profits sought by financial banks and hedge fund managers. Needless to say, this leaves few public resources to address structural problems, both within countries (health, education, infrastructure, etc.) and between countries (development issues, global warming). Wars may thus continue to plague us, including wars in which nuclear weapons are used (Toon et al. 2007), and one of which may be terminal.

CONCLUSION

The question is, therefore, whether it will be possible to turn us humans into benign parasites on the surface of the earth, whose various evolved ecosystems would retain their ability to function, or rather, whether we will continue to be part of the earth's ecosystem in the same way that a malignant tumor is — never for a long time — part of a person's body: All bets are off.

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