

The decoupling of human and natural systems makes me very grumpy

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Key words: population, consumption, hunger, agriculture, politics, stupidity

<http://dx.doi.org/10.7882/FS.2013.005>

There are three basic things about the world today that add greatly to my curmudgeonly tendencies. The first thing is the dire situation – one that threatens many people I love, to say nothing of all of humanity. Civilization is now faced with a perfect storm of environmental problems: climate disruption, loss of biodiversity and the crucial ecosystem services it provides, global toxification, severe resource depletion, decay of the epidemiological environment, and resource wars that may go nuclear (Ehrlich and Ehrlich 2013). This is not just a list – it’s a complex of dilemmas, with all the parts interacting and often reinforcing each other. Indeed, scientists like to talk about two coupled “complex adaptive systems” – the biosphere (the physical-chemical-biological envelope near Earth’s surface in which humanity is embedded) and the human social-political-economic system itself.

When ecologists speak of “coupled human-natural systems” they usually consider that, to quote Wikipedia, “sudden shifts in ecosystem state can induce changes in human understanding of the way the systems need to be managed. These changes, in turn, may alter the institutions that carry out that management and as a result, some new changes occur in ecosystems”¹ What I believe the data show is that human and natural systems are becoming *decoupled*, with the U.S. empire, the most powerful on the planet, leading the way.

A good place to see the failure to induce changes is by considering humanity’s most important activity and its largest industry – growing and distributing food to nourish its population. It was, after all, the agricultural revolution – inventing farming and animal husbandry – that permitted the specialization that set *Homo sapiens* on the road to planetary dominance (Ehrlich and Ehrlich 2009). According to some, that revolution was induced by the depletion of living resources being used to support what was then a global hunting-gathering lifestyle (Montgomery 2012). The human system was responding to that major change in the natural system. Subsequently, the increasing impact of *Homo sapiens* on the natural system created many responses in both systems. They included such diverse phenomena as dramatic changes in the flora of the western hemisphere after invading people wiped out many of the large herbivores, the evolutionary penetration of an expanding human-agricultural-urban niche by roaches, mice, rats, starlings, and a variety of bacteria and other parasites, and the coevolution of humanity with a

relatively small number of fungi, plants, and animals that became “domesticates.”

These changes led eventually to the industrial revolution and culminated in the last half century or so in a dramatic second agricultural revolution that rapidly generated a technology-dependent, increasingly corporate-controlled global food system. That revolution greatly expanded food production, fueled explosive growth of the human population, created consumer societies, and transformed the natural system. Huge areas were cleared of forests, the distribution of water on the planet was greatly modified, many populations of other organisms and not a few species were exterminated in an extinction episode of a magnitude not seen in 65 million years. Many minerals have been mobilized at rates exceeding natural processes (erosion, oil seeps), the climate itself is being disrupted, although uncertainty persists about the rate, and synthetic toxic substances and human-produced radionuclides have been spread throughout the biosphere. At the same time, these and the industrialization of agriculture have created serious vulnerabilities in the food system, especially in its heavy dependence on monocultures, the use of fossil-fueled farm machinery (particularly for mechanical cultivation of soils) and refrigeration, manufactured fertilizers and synthetic pesticides, antibiotic feed supplements, hi-tech fishing (“vacuuming” the seas), and rapid fossil-fueled transportation.

Today almost a billion people are hungry and perhaps another 1-2 billion are badly in need of better diets. Many observers claim that roughly doubling today’s food production by 2050 will be needed to give sufficient food to an expanding population that will have added 2.5 billion more people than exist today. Can that be done, even though billions are hungry or malnourished now? If so, humanity would need to substantially modify the human system. It would have to stop expanding the land area used for agriculture (to preserve ecosystem services); make a major effort to limit climate disruption; raise yields where possible while putting more effort into soil husbandry; greatly increase efficiency in use of fertilizers, water, and energy (Cribb 2011); take more care with pesticides, especially herbicides (Benbrook 2012); become more vegetarian; grow more food for people (not fuel for vehicles); reduce food wastage; stop wrecking the oceans; significantly increase investment in sustainable agricultural research; and move feeding everyone to the very top of the policy agenda.

1. http://en.wikipedia.org/wiki/Ecological_threshold

Most of these tasks will require changes in human behavior long recommended but thus far elusive. For instance, it is not clear how much of a dead end industrial agriculture has driven humanity into. Destruction of soils played a large role in the collapse of past civilizations, and many of today's practices speed that destruction (Montgomery 2012). It is unclear how long artificial fertilization can keep yields up as other vital characteristics of soils (nutrient- and water-holding capacity, soil flora and fauna, amount of organic matter, tilth, etc.) deteriorate. Similarly, much of agriculture is dependent on groundwater supplies that are known to be diminishing in many areas, especially where aquifers filled during the ice age are being "mined." There is scant information on the actual amounts remaining in many aquifers (Gleeson et al. 2012), and little is generally known about the vulnerability of coastal aquifers to the inevitable sea level rise with climate change.

Unfortunately there is no indication that this complex of urgent needs has penetrated the thinking of most involved in running the food system. It is especially disturbing that there is little sign that policy makers are interested in getting the answers, or even asking the questions. The problem of food wastage and the need for more and better agricultural research and technology transfer to farmers have been discussed for decades, as have schemes for tapping novel sources of nourishment, like raising bacteria on petroleum as a source of human food (Ehrlich and Ehrlich 1970, pp. 95-112). I doubt those planners planned to be eaters!

Many people think that the biggest threat from climate disruption is sea-level rise, and it is the most certain consequence of warming the planet. But although a large proportion of humanity lives close to coasts, rising seas are not likely to seriously affect more than a few hundred million people this century, and the impacts are likely to develop gradually, providing some leeway for adaptation. If we are extremely unlucky, however, and there is a sudden rise of say 7 m before the end of the century, all bets are off.

Tragic as even slowly rising seas will likely be for many, the more than a millennium of altered rainfall and temperature patterns that seem already entrained (Solomon et al. 2009) is a much more frightening prospect. Crops require the right amounts and timing of water availability and a certain range of temperature in order to produce adequate amounts of food. The importance of water delivery is emphasized by the production of something like 40% of grains (the feeding-base of humanity) on the 15% of land that is irrigated. The challenge to the human system of more or less continually revising water-handling infrastructure could become gigantic as rainfall and snowfall migrate in difficult-to-predict patterns and glaciers and snow packs disappear. And, of course, an even more gigantic challenge is altering the human energy-mobilizing technologies of the human system to reduce fossil fuel dependence by more than 50% within decades (Alexander 2012).

In sum, humanity is faced with finding a way to feed an additional 2.5 billion people by 2050 while improving the diets of 2-3 billion people already with us who are hungry

or malnourished. It must undertake this task with less area of high-quality farmland and with that in use often being degraded, as well as with less water, less oil, less phosphate fertilizer, and a less dependable climate, and most likely, a declining harvest from the sea. That's quite a challenge, especially when most political leaders in industrial nations are utterly ignorant of the ecology of agriculture. This "human predicament" is so severe that scientists now are discussing the odds that it will lead to a collapse of civilization, while the whole human system shows little sign of responding to the crisis.

The second thing that makes me grumpy is that lack of response from the public. This increasingly dire situation is completely ignored in the mainstream media and by many people who know better. Worse yet, some commentators try to fool people about its very existence (think Fox News). This is in part a gross failure in environmental education, which should be first rate and start in kindergarten (Blumstein and Saylan 2011, Ehrlich 2011), but isn't and doesn't. By the time they are out of middle school, everyone should understand such things as how we know Earth is overpopulated (humanity is living on its capital, not the interest from it), that the rich are overconsuming (from energy use and resource depletion patterns), and that climate disruption is largely anthropogenic (evidence from temperature patterns and carbon isotopes). But even many college professors and most politicians are ignorant of these basic facts of the human condition, and when asked where their food comes from can at best say "the supermarket." Ignorance of how the food system works is clearly a major factor in the decoupling.

In 2012, the United States conducted a disastrous presidential campaign in which *none* of the potentially lethal environmental problems facing civilization were the subject of significant discussion – except for planning to make them much worse. Pushing to make the U.S. "energy independent" by bringing on line more dirty and hard-to-extract fossil fuels was a big element in the Republican campaign. That's the intellectual equivalent of mobilizing domestic cyanide supplies to cure the hunger problem. Both parties were hooked on promoting the basic environmental disease, economic growth; no candidate recognized that, as the old saying goes, "perpetual growth is the creed of the cancer cell." The Republicans attacked President Obama as a "redistributionist," a preposterous claim on two grounds. While it is crystal clear that major redistribution from the very rich to the very poor will likely be required (or may come about by force) if civilization is to survive, Obama actually has espoused only minimal policies to make the rich pay a little more of their share for retaining a viable society. But the other ground is even more disgusting, as the Republicans have been an extremely successful bunch of redistributionists, taking money from the poor and giving it to the rich (the famous "Hood Robin" effect). Neither party paid the slightest attention to the two basic drivers of the human predicament, overpopulation and overconsumption, or to the plight of the billions of people who are hungry or poverty-stricken. The horrifying prospect of having to care well for 9.6 billion people in 2050 (when we can't do it for 7.1 billion today) was never mentioned.

Worse yet are the attitudes of many people who ought to know better but who choose to ignore the human predicament – especially figures in the news media who refuse to question political candidates on any fundamental issues, unless you count the resource wars being prepared for or fought by the American empire². Beyond the pale are those intellectual prostitutes who, presumably for financial gain, personal ego gratification, or because of irrational ideological positions, are working to confuse the situation or make it even worse. Outstanding examples include the liars and anti-regulation nuts who work for fossil fuel companies and right-wing “thoughtless” tanks trying to convince people there is great uncertainty about whether anthropogenic greenhouse gas emissions are disrupting the climate.

If most people knew that human activities were the principal culprit and grasped the enormous danger civilization is in (e.g., Hansen 2012), the fossil fuel companies would have to leave a large portion of their proven reserves in the ground, thus destroying much of the industry’s economic value (McKibben 2012). As Naomi Klein wrote about the fossil fuel industry, “wrecking the planet is their business model. It’s what they do” (McKibben 2012)(p. 9). The time-honored ethic of the oil, coal, and gas producers and some other “murder incorporated” industries -- perhaps most famously cigarette peddlers (Proctor 2011), arms manufacturers and their co-conspirators³ --- is not caring about the lethal consequences of their profitable activities. It is thus hardly surprising that those who have large financial stakes in the fossil fuel industry launched a gigantic and largely successful disinformation campaign in the United States, Britain, and Australia to confuse people about what lies ahead (Klein 2011, Oreskes and Conway 2010).

Then there are the sexually disoriented old men in the Vatican who struggle to control women’s lives and keep the population growing. Other very conservative religious groups hold similar attitudes, from conservative leaders of Islam to fundamentalist Protestants who oppose legal abortion and even access to contraceptives. In vastly overpopulated, water-short Israel, many people told me that they are more fearful of the orthodox, who have about seven children per family, than of the Arabs. Within a few decades, the country may be entirely in the hands of right-wing religious nuts. Male dominance, abuse of women, and high birthrates still tragically persist in large areas of the world, especially in sub-Saharan Africa and southern Asia. And in no nation are women treated as fully equal to men and entirely free from sexual abuse.

If civilization is to survive, the trend toward endarkenment must be reversed, and one towards an evidence-based rather than faith-based culture must prevail. There are some encouraging signs, however. One is the reproductive performance of Catholics, a major segment of whom refuse to play along with Church teachings. They behave the same way as non-Catholics in similar economic situations,

and predominantly Catholic nations in Europe have some of the lowest birth rates in the world. Another is the rebellion of American nuns, attacking the bishops for their antediluvian views and arguing with Catholic misogynist Paul Ryan when he was running for the vice-Presidency of the United States.⁴ And evangelical Richard Cizik has been a leading advocate of sound planetary stewardship and family planning to his great personal cost. Hopefully he represents a new trend in conservative religion.

Then there are the ill-informed, greedy politicians. The most recent prominent U.S. example is the blessedly unsuccessful presidential candidate Mitt Romney, who like most politicians, has no clue about how dire the environmental dilemma has become. This is hardly surprising, since his greed-saturated synapse is unable to grasp that major responsibilities of a democratic government are to be sure its citizens are well fed and have decent educations and health care – which in large part requires the government to ensure a reasonable distribution of wealth and to redistribute it if necessary.

For further political cluelessness we can look to Georgia’s Paul Broun, a Republican member of the Science, Space, and Technology Committee of the U.S. House of Representatives. He has dismissed evolution, the Big Bang theory, and embryology as “lies straight from the pit of hell”. Broun is an MD who claims that “as a scientist” he has data showing Earth is no older than 9,000 years and was created in six days, instead of the 4.6 billion years indicated by all the evidence. Broun asserts that theories of the origins of the universe and evolution are “lies to try and keep me and all the folk that were taught that from understanding that they need a saviour”. It is clear that he is not the only intellectually-challenged member of the Committee. Another Republican member, Todd Akin of Missouri, during the election campaign attracted attention to his misogynistic imbecility by claiming it was “really rare” for rape to result in pregnancy. “If it is legitimate rape, the female body has ways to try and shut that whole thing down,” he averred, while defending his position that abortion should be banned in all circumstances.⁵ He lost his re-election bid, but with a government larded with people with such a thorough grasp of science, it is hardly surprising that at least the U.S. portion of the “coupled” human-natural system has come uncoupled.

Perhaps even more aggravating personally than the foregoing is a group I like to think of as the “intellectual fatheads.” Examples are the employees at right-wing thoughtless think tanks like the Competitive Enterprise Institute (CEI), political scientist Roger Pielke Jr., renowned for fatuous statements about climate change, and undistinguished statistician Bjorn Lomborg, who publishes meretricious books and serves as a shill for anti-environmental interests. For example, the worst science reporter in the mainline media, John Tierney, used these hacks to attack John Holdren, one of the most honored

2. Yes, I know it’s not the same kind of empire as the one Queen Victoria ruled over.

3. <http://www.politicususa.com/nra-presser-promo-gun-profits-board-members.html>

4. <http://www.thedailybeast.com/articles/2012/08/16/catholic-nuns-gun-for-paul-ryan.html>

5. <http://www.guardian.co.uk/world/2012/oct/06/republican-congressman-paul-broun-evolution-video>

and admired scientists in the world, when he was chosen to be President Obama's science advisor. As physicist Joe Romm commented: "The first thing to say is that if Tierney, Pielke, Lomborg, and CEI all disagree with you on any point related to climate, energy, or science, you can sleep soundly knowing with 100% certainty you are right."⁶ Another example of an annoying ideologue who attempts to impede progress toward dealing with the human predicament by publishing and speaking nonsense critical of any and all who are working toward solutions is Mark Sagoff. Philosopher Clive Spash describes him in a review as "espousing supposed American Christian values and branding environmentalists as left-wing" (Spash 2009). Intellectually Sagoff is like a dinosaur shot in the hind-brain – dead, but he doesn't know it yet (e.g., Daly 1995).

The critical importance of substantially boosting the current inadequate action on the demographic driver of change in the natural system can be seen in the time required to alter the trajectory of population growth humanely and sensibly. In contrast, we know from such things as the World War II mobilizations that many consumption patterns can be altered dramatically in less than a year, given appropriate incentives (Ehrlich and Ehrlich 2010). But the trajectories of the major drivers of the predicament cannot be changed overnight.

If food shortages became acute, for instance, a rapid and dramatic reaction in the human system would likely ensue as hunger became much more widespread. Food prices would rise, diets (e.g., the amount of meat consumed) could change rapidly, and famine might well provoke investment in some long needed improvements in food production. Depending on the degree of compassion (or desperation) in societies faced with famine, some unconventional approaches to producing food might actually be tried, although it would probably take much time to plan and bring them on line. The only feasible changes would be essentially emergency actions with few long-term effects, providing little hope of avoiding mass starvation and keeping global civilization together. Significantly and securely increasing the global food supply will necessarily be a slow and difficult process, especially in the face of changing climates. *And there would be no humane way to quickly reduce the number of consumers.*

Accordingly, the third and final thing about the human predicament that makes me grumpy is how scientists, who know better, fail to comment on population growth as one of its principal drivers and do not point out the environmental non-linearities associated with that growth (Ehrlich and Holdren 1971, Harte 2007). Otherwise excellent papers (e.g., Foley et al. 2011) that deal with the problems of feeding humanity in mid-century do not even give a clue that arriving at 9.5 billion people is not a guaranteed event, but fully amenable to human intervention. They don't explain that trying to arrange the world to feed the next one billion people will make it disproportionately difficult to feed an additional billion beyond that. One otherwise sensible book by a science journalist (Cribb 2011) recognized the population dimension of the human predicament and listed

many things that could be done by society about the food crisis, but did not mention steps to limit population growth. In a list of suggested personal actions, the book also did not say "stop at one child – absolute maximum of two"! Too many otherwise reasonable analysts don't point out that if women are given more rights, education, and job opportunities, and if all sexually active people get access to modern contraception and back-up abortion, birthrates will drop (Potts 2009). They might even drop far enough that the global population could enter a gradual shrinkage toward a sustainable number.

Even though such an approach would both be relatively inexpensive and carry enormous other benefits, it is rarely mentioned. That is largely because the use of sex for power among leaders to control the credulous prevents enough being done on this critical aspect of the human system. Many other things governments could do to help end the lethal growth of population, such as ending subsidies to childbearing for affluent couples, are simply considered beyond the pale.

So it is clear that the human part of the human-nature coupled system is causing a gigantic transformation in the natural part, but is itself making at most trivial changes in response. The system is clearly coming decoupled, and the costs of measures to recouple are escalating. But they are nothing at all compared with the price civilization will pay if the decoupling is allowed to continue.

Australia is in an excellent position to lead the way in recoupling. For instance, population size is already a political issue (unlike in the United States). Oz could, for example, adopt a population policy with an ideal limit designed to make the nation more or less permanently sustainable. Ten million people comes to mind, although in the long run as many resources ultimately become scarcer (Klare 2012) and climate disruption escalates, that might still prove much too high. Australia could also formulate a comprehensive climate adaptation policy with emphasis on security of water and food supplies. It could stop exporting fossil fuel "resources," and especially stop mining them in their best agricultural areas. The new Murray-Darling (river) basin agreement is a good example of what needs to be done.

Australia also could lead in converting its energy system to renewables, especially solar, instead of exporting the nation's opportunities for production overseas. Of all countries, Australia has some of the world's greatest solar scientists and solar potential. Profits from developing, manufacturing, and exporting solar technologies could, in the medium term, more than replace those lost in ending the supplying of lethal coal to all comers. Finally, Oz could develop an epidemiology invasives policy focusing on human disease and environmentally critical organisms, aimed at protecting both its citizens and its life-support systems. Doing those things would set a standard for other nations and make Australia a world leader in dealing with humanity's most important problems. It could become the industrialized exemplar of "small is beautiful."

6. <http://grist.org/article/more-proof-holdren-is-a-great-choice/>

Acknowledgements

This paper has benefited greatly from the comments of Andy Beattie, Anne Ehrlich, and Harry Recher.

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