The False Promise of Green Technology

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2012

Contents

Part 1.

At this time, many people are at least generally aware that environmentally harmful human activities have caused a number of serious ecological problems, amounting to a kind of crisis. The phenomenon of global warming is probably the best known example, although there is also some awareness around issues like deforestation and the dangers of nuclear energy.

Several decades ago environmental groups were able to push the motto "reduce, reuse, recycle" into the public consciousness, although in actual practice the concepts "reducing" and also to some extent "reusing" were largely ignored. Today a new answer to environmental problems has been offered, one that doesn't just tolerate forgetting to reduce and reuse, but actually suggests that consumption itself is the solution. "Green" consumption has taken the day. Whereas in 1985 the "environmentally conscious" thing to do might have been to turn off the lights in your house for more of the day, now consumers are led to believe that simply buying energy-efficient light bulbs will instead do the trick. Don't get me wrong, I'm not arguing that mainstream environmental movements were actually better informed in the 1980s, or that the solutions offered in that day would have actually been sustainable. Nevertheless, the current obsession with "buying green" *is* uniquely absurd.

Plenty of other pieces have been written explaining some of the problems with what has been called today's "greenwashing." Excellent points have been raised concerning its deeply consumeristic character, the fact that it actually bolsters the growth-based capitalist economic model which in and of itself cannot be sustainable, and the fact that it places the burden of fixing the ecological crisis on individual consumers, rather than on the industries who are actually to blame for creating this mess in the first place. My intention is not to go against what these other pieces have said, but rather to shine some light on one area of the debate that has too often been left in the shadows, namely, the supposed sustainability of green technology itself. The very axioms of the latter remain insufficiently addressed and demand interrogation.

I begin by acknowledging something of a broad public awareness that much of today's technology is not sustainable. Somehow, this non-sustainability has contributed to various ecological problems. Since it is assumed that we must continue receiving the "benefits" of all of this technology, the obvious solution is to replace non-sustainable technology with roughly equivalent sustainable technology, rather than simply reducing its use or scrapping it altogether.

It's fairly well assumed that green technology is in fact sustainable. Many take it on good faith that switching to various green technologies will in some way fix or at least mitigate the ecological crisis, getting it under control and allowing environmental integrity to be maintained or returned to more appropriate levels. In the US it is commonly believed that much of the responsibility for accomplishing this switch over falls on individual consumers, by way of their purchasing decisions. I must stress, however, that many who are otherwise critical of today's capitalist "greenwashing" scam still ultimately believe the larger promise of green technology to be true. They may simply feel that other actors, potentially the state or in some cases revolutionary movements, should be responsible for ensuring this "progress." Since most people lack a working definition of "sustainability" themselves, they are individually unable to critically determine whether or not this larger concept is in fact true.

Allow me then to provide a definition of sustainability.

An activity is sustainable only if it doesn't deplete or harm its environment in such a way that would make that activity impossible to continue. Sustainable activities can continue for as

long as their environments remain and don't change or disappear for other reasons. To be more specific, a sustainable activity replaces, to the greatest degree possible, everything it uses with material that is just as good as or better than what it took, according to how surrounding plants, animals, insects, etc. can make use of the byproduct. If what's given back to the environment is severely depleted, toxic or otherwise harmful to surrounding organisms, then that activity is not sustainable.

Most people are familiar with the concept of nonrenewable resources, and are aware that an activity dependent on the use of such resources (a depletive activity) will eventually become unworkable. Most depletive activities are however also *destructive* activities; burning a fossil fuel depletes that resource, but also pollutes and harms the environment. If a destructive activity continues for long enough, it will effectively obliterate the environment surrounding it, and all of the life forms that depended on that environment, stopping that activity just as effectively as if the originally desired resource had simply run out. Any human activity, then, stops being sustainable when it becomes more depletive *or* destructive than the surrounding ecosystem can afford.

We can now, figuratively speaking, run various green technologies through the filter of this definition, sifting out what is and is not sustainable. It scarcely needs to be said that the following litany of facts and statistics is not a complete list, but a selection of illustrative examples.

A little bit of research into various green technologies and particularly their manufacture reveals some potentially surprising results.

In general, green technology has some basic things in common with all other industrial technology. That is, from solar panels to wind mills, from low-draw light bulbs to energy efficient washing machines, from the US army's new earth-friendly "green bullet" to hybrid vehicles, all of these things require metals, and in most cases plastics to create.

Indeed, metals and plastics are literally the building blocks of today's modern industrial civilization, green or not.

A fundamental starting point is to look at how we actually get these materials out of the ground. Industrial metals are refined from ore, or rock with usable elements in it. The process of separating ore into its usable and non-usable components leaves behind tremendous waste. These mining wastes, or tailings, often contain one or more of the following:

- Arsenic — An especially potent poison, used at various times to make insecticides, herbicides, and military chemical weapons.
- Barite — Contains elemental barium, all soluble salts of which are highly toxic.
- Cadmium — Extremely toxic even in low concentrations. Inhaling cadmium-laden dust quickly leads to respiratory tract and kidney problems which can be fatal. Ingestion of any significant amount of cadmium causes immediate poisoning and damage to the liver and the kidneys. Compounds containing cadmium are also carcinogenic.
- Calcite — Dust of which has been found to cause lung damage.
- Fluorite — Composed of calcium fluoride. The 1984 issue of Clinical Toxicology of Commercial Products lists fluoride as more poisonous than lead and just slightly less poisonous than arsenic. It has been used as a pesticide for mice, rats and other small pests.

- Lead — Infamously toxic as illustrated by the widespread neurological damage among children who grew up in low income housing with peeling lead paint and aging leaded water pipes.
- Manganese —Linked to impaired motor skills and cognitive disorders.
- Radioactive materials — Presumably no description is needed.
- Sulfur (and sulfide compounds) — Hydrogen sulfide is toxic. Although very pungent at first, it quickly deadens the sense of smell, so potential victims may be unaware of its presence until death or other symptoms occur. Sulfur trioxide, a volatile liquid at standard temperature and pressure, is extremely dangerous, especially in contact with water, which reacts with it to form sulfuric acid with the generation of much heat. Sulfuric acid poses extreme hazards to many objects and substances.
- Zinc — The free zinc ion in solution is deadly to plants, invertebrates, and even vertebrate fish.

As we can see, many of these things are toxic, caustic or otherwise harmful.[1] In addition, sulfuric acid is created when certain of the above mentioned materials enter the waters of nearby streams and then oxidize. This wipes out all life in the effected stream sections, which can be many miles long. Use of the notoriously lethal substance cyanide is also increasingly necessary for the separation of gold and other metals from ore. Mines commonly utilize a number of other toxic substances in this process as well, including sodium ethyl xanthate, which easily forms a dangerous gas that is readily absorbed through the skin, or potassium amyl xanthate, which is deadly to certain fish, or, yet again, even more sulfuric acid, simply adding to that which already forms in streams because of nearby mines.[2]

Mining, or rather digging or blasting massive holes in the ground, is a dirty process. Even the most tightly regulated, "clean" mines leak these harmful substances into the surrounding environment. The ponds constructed to store most watered-down, "wet" mine tailings are also somewhat prone to constant leaking and catastrophic failure. As such, small streams, huge rivers, underground water sources, animals, and the people that depend on all these things continually suffer the ravages of mine-related disasters.[3] When these toxic tailings aren't held in ponds, however, they are sometimes left in dry dust form, strewn around mining sites, where they simply blow about in the wind.

Even if such accidental disasters and instances of carelessness were able to be effectively minimized or prevented, the practice of intentionally tearing up huge patches of the earth would still be socially disastrous, as mine sites are often ecologically important and sacred to local indigenous peoples. Genocide or its functional equivalent is therefore a necessary precondition of industrial metal extraction. Since this exposition focuses on technology specifically, I will leave the discussion of mining at that.

[1] Jensen D, McBay A. What we leave behind. New York: Seven Stories Press; 2009.

[2] Jensen D, McBay A. What we leave behind. New York: Seven Stories Press; 2009.

[3] For a Chronology of major tailings dam failures, see: "http://www.wise-uranium.org/mdaf.html" For one specific example, see: "http://www.guardian.co.uk/world/2010/oct/06/toxic-sludge-hungary-danube"

Of course, toxic materials don't suddenly become harmless once they have been removed from the ground. The modern appliances that many of us surround ourselves with contain numerous active or passive threats to our health:

> "A whole bouquet of heavy metals, semimetals and other chemical compounds lurk inside your seemingly innocent laptop or TV. E-waste dangers stem from ingredients such as lead, mercury, arsenic, cadmium, copper, beryllium, barium, chromium, nickel, zinc, silver and gold. Many of these elements are used in circuit boards and comprise electrical parts such as computer chips, monitors and wiring."[4]

As previously mentioned, most green technology also requires plastics to manufacture. Whether this particular technology actually has plastic components or is manufactured with machines and tools that use plastics doesn't matter much, either way plastics are necessary. Plastics are made with, among other things, petroleum, which is (as many people now understand) nonrenewable and immensely harmful to extract and refine. One of the most common plastics that we encounter is polyvinyl chloride, or PVC. The production of PVC (and most all plastics or chemicals) creates dioxins, and after production more dioxins leach out of the PVC that surrounds us. This is a highly detrimental phenomenon because dioxins, as a class of chemicals, are some of the most hazardous and deadly substances known, "dangerous at doses of several parts per trillion." In addition to being "highly carcinogenic and poisonous," dioxins also alter the function and structure of living cells in disastrous ways. Once accumulated, (either directly through the environment or by consuming the flesh of a contaminated organism) dioxins stay active in human bodies for between four and twenty years.[5]

Many industrially produced items, products like carpet and paint, also utilize flame retardant chemicals called poly-brominated diphenyl ethers (PBDEs). These also coincidentally help give cars (yes, even green hybrid cars) that "new car smell."[6] In addition to liver and thyroid toxicity, exposure to PBDEs has been proven to cause problems in reproductive organs and with memory loss. A veritable laundry list of health problems caused by exposure to various other plastics could be drawn up, but a complete one would be too long for this brief piece. This list would, however, include cancer, birth defects, chronic bronchitis, ulcers, skin diseases, deafness, and blindness, to name just a few.[7]

So far I have focused on the rather obvious commonalities between green technology and all other industrial technology. Now let us move on to address what green technology claims to be truly distinguishable by.

A central plank of the green tech movement is the recycling of manufactured wastes and worn-out goods. Recycling won't in actuality help us decrease our production of toxins much though, as this is yet another industrial process often requiring the input of large amounts of energy and synthetically produced, non-renewable substances. Even paper recycling generally utilizes chlorine gas and hypochlorites in the re-bleaching process, releasing more dioxins and carcino-

[4] Toothman J. How E-waste Works. [internet]. [cited june 6, 2011]. Available from "http://electronics.howstuffworks.com/e-waste.htm"

[5] Jensen D, McBay A. What we leave behind. New York: Seven Stories Press; 2009.

[6] Jensen D, McBay A. What we leave behind. New York: Seven Stories Press; 2009.

[7] Ecology Center. Adverse health effects of plastics [Internet]. 2001 [cited May 28 2009]. Available from "http://www.ecologycenter.org/factsheets/plastichealtheffects.html"

gens into the environment.[8] Simple physics also dictates that in an energy intensive activity like recycling you will not recover all of the solid material that you put in: it's an imperfect process that still at some point ultimately leads to a complete loss of usable material.

At this time much of the recycling of electronic waste, or 'e-waste' that goes on cannot by any stretch of the imagination be considered an "earth-friendly," much less a "people-friendly" activity. An article from HowStuffWorks.com walks us through the chilling truth of the state of this practice today:

> "Picture something like this: Mountains of discarded TVs and computer monitors tower above the rutted streets of a low-income urban community. In order to make a living, hundreds of people work in the shadow of this heap of e-waste. Some people tend fires which burn and remove the plastic from copper wires, putting out billows of noxious smoke. Other workers swirl circuit boards in tubs of nitric and hydrochloric acid to release the solder and precious metals — at the same time releasing gas that stings their eyes. Plastic chips, obtained from smashing devices like keyboards and computer casings, are broken into tiny pieces and carefully sorted before they too are burned and melted together into a sellable chunk. And at the end of the day, all the byproducts that have no further useful purposes, like charred circuit boards and used acid compounds, usually are dumped in open fields and rivers or are burned."[9]

The dangerous nature of E-waste recycling can be quantitatively eased by increasing safety standards, but cannot be qualitatively changed due to the inherent toxicity of the materials involved. Remember that part about "If what's given to the environment is severely depleted, toxic or harmful to surrounding organisms, then that activity is not sustainable"? As it turns out, the processes required for producing, using and maintaining industrial technologies, whether green or not, are both depletive and massively destructive.

Another major aspect of green technology is allegedly sustainable energy. Many have already learned that burning fossil fuels for energy is not sustainable, and that it must stop soon. Some are learning that other energy sources, like dams, cause serious negative effects, such as deteriorating the waterways that act like the life-giving veins of many lands, and actually produce large amounts of green-house gasses.[10] But if we really look at the proposed green alternatives, it turns out that these sources of energy are also far from sustainable. The production of one of the more common types of photovoltaic cells (solar panels), for example, releases:

> "… fluorine, chlorine, nitrate, isopropanol, SO2, CO2, respirable silica particles and solvents… Fluorine and chlorine are also emitted to the water … [which] contribute to human toxicity, as does nitrate, which stems from neutralizing acids used in etching and texturing… Silica particles can be released in the mining and refining stage [which] may cause the lung disease silicosis. Emissions of solvents and alcohols

[8] Chemicals Used in Paper Recycling Mills [internet]. [cited June 6, 2011]. Available from "http://www.ehow.com/facts_5731899_chemicals-used-paper-recycling-mills.html"

[9] Toothman J. How E-waste Works. [internet]. [cited june 6, 2011]. Available from "http://electronics.howstuffworks.com/e-waste.htm"

[10] Graham-Rowe D. Hydroelectric power's dirty secret revealed [Internet]. 2005 [cited May 28, 2009]. Available from "http://www.newscientist.com/article/dn7046-hydroelectric-powers-dirty-secret-revealed.html"

> [also] contribute to photochemical ozone formation and both direct (the solvents itself) and indirect (ozone) respiratory problems."[11]

Other specific problems from birds killed by windmills to food crops crowded out by fuel grains can be found when examining any given proposed green energy source. Even setting this aside for a moment, the various industrial devices that we would ideally power with the supposedly "clean" energy are, as we have learned, also not sustainable to produce. These devices employ the very metals and plastics used in all industrial non-green technology and whose hideously toxic effects are selectively catalogued in the prior pages. Indeed, this fact is one of the biggest lacunae in the whole of the green technology paradigm.

Some cling desperately to the notion that environmental destruction can be overlooked as long as it occurs far enough away from them, that they can preserve their own backyards as it were while foreign lands are laid to waste.

The motto "the solution to pollution is dilution" suggests that there is so much vast open space on the planet that simply spreading out our toxic garbage to a harmless degree is actually feasible. This is a severely misguided notion. While our biosphere (the portion of our planet that can actually support life) might appear to be spacious enough to accommodate both us and all of our toxic waste, it is in fact an astoundingly thin, shallow envelope sandwiched tightly between hard rock and cold space. Proximity plays less into the equation than we might be tempted to think as any and all environmental damage eventually comes back around, affecting those who started the damage as well as those who did not. Everything in nature is ultimately connected in some fashion. As a result, the loss of habitat, or a specific environment, anywhere, also harms habitats everywhere. This understanding undoubtedly motivated the saying attributed to Chief Seattle, paraphrased here, that "humanity did not weave the web of life; humanity is merely a strand in it. Whatever humans do to the web, they do to themselves."

The reason why I have freely interwoven reports about chemicals that cause diseases in individual humans on the one hand and those that affect entire watersheds on the other is that there's really no qualitative difference between them. Sustainability is absent in the one case just as surely as it is in the other.

So what exactly is the significance of all of this information?

Environmental destruction is about far more than spoiling some bucolic vistas or killing a few million fish or owls. Unfortunately for us, the ecological crisis we are in is actually much more severe than most realize. Many have ignored or forgotten what such widely recognized and regarded sources as the American Museum of Natural History (AMNH) and the United Nations agree upon, namely that "we are in the midst of a mass extinction of living things, and that this dramatic loss of species poses *a major threat to human existence in the next century*".[8, emphasis added] To be more specific: Senior Vice President of the AMNH Dr. Novacek tells us that "we are in the middle of a sixth major mass extinction… The last great extinction event occurred at the end of the Cretaceous period, about 65 million years ago, when an estimated two-thirds of all species, including all the dinosaur groups except the birds, were obliterated."[12] We have

[11] Phylipsen GJM, Alsema EA. 2007 [cited December 21, 2008]. Summary 'Environmental life-cycle assessment of multicrystalline silicon solar cell modules' Report number 95057. [Internet]. Available from "http://www.projects.science.uu.nl/nws/publica/Publicaties%201995/95057.htm"

[12] Novacek, MJ, editor. Preface: Biodiversity. In: The biodiversity crisis: an American museum of natural history book. New York: The New Press; 2001.

manufactured a comparable extinction event. President Emeritus of the MO Botanical Garden Peter Raven reports that "over the next few decades, we could lose about 50,000 species per year, a rate 20,000 times the [average natural] rate. By the year 2100, perhaps two-thirds of the Earth's current species will have disappeared or be on the way to extinction."[13]

Considering what we now know about how life systems work on this planet, that is, how tightly interwoven and connected they are, it is very unlikely that Homo Sapiens Sapiens (modern humans) will survive such an extreme downsizing of biodiversity on this planet. The millenarian/apocalyptic sounding notion that the next few generations could be the last actually rests on a plausible scientific basis. Furthermore, in this latest stage of what is now called the Holocene extinction event (named for the geological period of time we are now in), the activities of industrial, "civilized" humans are solidly to blame. The industrial economy has been around for less than 1% of the time that humans have existed, and in that short period it's already facilitated our delivery into this sorry state of affairs. It has not only achieved this through grand headline-generating means like global climate change, but also through a multitude of small, mundane occurrences which have only become catastrophic through repetition.

Many people have come to view non-sustainable technologies as "less preferable, but still an option." That is, many do not take issues of sustainability vs. non-sustainability seriously. They see the whole problem as a regrettable, messy inconvenience, rather than as an immediately life-threatening issue. Simply put, we have to snap out of it.

Part 2.

So what are we supposed to do, then, if adopting green technology does not fix but perhaps even worsens the very crisis it claims to solve?

Well, this might come as a shock to some, but the vast majority of human life has been lived without any industrial technology. Also, before going any farther, do yourself a favor and forget the racist arrogance of past historians and social scientists. Life without industrial technology is not necessarily "nasty, brutish and short." Many anthropologists have countered that, if anything, perhaps the opposite is true. Marshall Sahlins was one of the first to make this point when he described non-industrial peoples as having established the "original affluent society."[14]

Few would argue with the notion that science, on the whole, has been somewhat deformed in the egomaniacal pursuit of mastery and control over nature, for profit, and so on. But under all of this built-up hubris still lies a few noble scientific principles worth heeding; one of these worthy understandings is Occam's Razor. Generally shortened to "all other things being equal, the simplest answer is usually the right one," a more exact wording of the precept is that between two similar phenomena, if the cause of one is understood, then needless complication should be avoided in explaining the other. In a broad sense, this understanding should help us to see that sustainability is not something that we need to dream purely out of thin air, appealing to increasingly novel and grandiose technical approaches. Rather, some human societies have already successfully found and practiced sustainable ways of living. Our efforts should, I propose,

[13] Raven PH. What have we lost, what are we losing? In: Novacek, MJ, editor. The biodiversity crisis: an American museum of natural history book. New York: The New Press; 2001. Pp.62.

[14] Sahlins M. The original affluent society. [internet reprint] [cited October 13, 2011]. Available from "http://www.primitivism.com/original-affluent.htm"

proceed from and not unduly complicate this pre-established base of knowledge (which is often highly empirical even if expressed and transmitted in non-academic terms).

For example, let us take a quick look at the logistics of the traditional lifestyle of the peoples indigenous to the area where this piece was written (the Pacific NW of what is colonially known as the "United States").

It is reported that indigenous Multnomah and Clackamas Chinook-speaking peoples did and do fish for at least five species of salmon, sturgeon, steelhead trout, eulachon, and herring along the Columbia (*Wimahl* or *Nch'i-Wàna)* and Willamette (*Wallamt*) rivers using nets or spears. Elk, deer, bear and other smaller mammals and foul were and are hunted for food, clothing, and tool making materials. Berries, spring shoots, roots and tubers (principally wapato), bulbs (like Camas), acorns, ferns, horsetails and cattails were and are important food and medicine items gathered and sometimes lightly tended where they grow. Winter structures included gabled-roof, excavated floor, lashed cedar plank houses kept warm by pit fires. Lighter summer structures in other locations supplemented these. Domestic items "included a variety of carved, woven, and shaped utensils and ornamentations of wood, bone, shell, cedar bark and spruce roots, beargrass, cattail rushes, antler, horn, and other materials."[15] Watertight containers both woven and fitted were built. Warm, rainproof clothing was and is made with plant and animal materials. Long distance travel could be accomplished via canoe, and later by horse.[16]

Instead of utilizing agriculture with its often devastating modifications to the natural environment, these and many other indigenous peoples place an emphasis on cultivating and maintaining the natural abundance of the riparian zones, river beds, forests and valleys. Wild foods were abundant, not nearly as prone to blight or famine as cultivated varieties, and provided superior nutrition when compared to virtually all industrial *or* organic/agricultural diets. In total, all of the materials used for the production of needed items including clothing, tools and shelter were ostensibly benign and biodegradable from an environmental standpoint. Preventative healthcare and the absence of industrial pollutants and practices meant that as a general rule these peoples did not suffer from the modern epidemics of cancer, heart disease or diabetes, for example. Social arrangements and medicinal practices generally converged to maintain population numbers that prevented the immediate surrounding land base from being overtaxed.

Mind you, the picture being painted is not one of a utopia (the word literally means "no place"). These societies were absolutely beset by their fair share of problems; propagating the myth of the "noble savage" is in many respects just as harmful as engaging in any other racist practice. Rather than idealistically hoisting this kind of lifestyle up onto a pedestal, I want to encourage an understanding of it as the norm for humanity, a mode that on a basic level just works. It is the industrial way of life that constitutes an extreme deviation from the norm, one which is threatening catastrophic consequences. This deviation and the resultant imperialism and colonization have already left once thriving indigenous populations among the sickest, hungriest and most impoverished.

No legally competent or, more importantly, morally acceptable transfer of ownership of or responsibility for the vast majority of this land has ever taken place between the indigenous and settler peoples. Indigenous activists like the Columbia River's Sohappy family continue to this

[15] Wayne S, William CS, editors. Handbook of North American Indians. Vol. 7: Northwest Coast. Washington (DC): U.S. Government Printing Office; 1990.

[16] Wayne S, William CS, editors. Handbook of North American Indians. Vol. 7: Northwest Coast. Washington (DC): U.S. Government Printing Office; 1990.

day to fight to be allowed to act as the rightful stewards of the land and water.[17] For those of us who are not indigenous to recognize legitimate indigenous authority at this time would not so much be an act of charity, or even only of solidarity, but perhaps more one of self-preservation.

When judged against the standards of capitalism it is true that these and other peoples practicing similar traditional lifestyles, not having access to ever expanding amounts of money or manufactured goods, live in abject poverty. However, if one instead judges against a set of relatively fixed standards such as physical and mental health, adequate housing, access to clean water and healthy food, leisure time, enjoyable subsistence activities and on in that vein, then we find an almost across-the-board prosperity (hence Sahlins' previously mentioned "affluence"). Perhaps ironically, what is often thought of as "the desperate struggle against wild nature for survival" is considerably more pleasant for nearly everyone concerned than the *actual* struggle against modern society for survival.

I'm not suggesting that those of us currently living in highly industrialized modern societies must *adopt* the exact practices of any specific non-industrial people. Rather, we must *learn from* the numerous examples of actually existing sustainable societies and draw our inspiration from there.

We should learn to stop being suspicious of solutions that originate outside of a laboratory or research-and-development facility. Non-industrial societies have been the *only* ones to achieve sustainability; no industrial society anywhere has been able to claim similar success. Therefore our sympathy should rest securely with non-manufactured answers to the problem of sustainability, and we should be suspicious of green technology in the extreme. It is green technology that must shoulder the very heavy burden of proof.

Admittedly, it's hard to imagine many currently industrialized people voluntarily adopting non-industrial lifestyles. Many rightly point out that industrial technologies, heavily relied upon in modern food production and distribution for example, are currently necessary due to the massive human population. While simple overpopulation is not the primary problem that racist/conservative interests make it out to be, de-industrialization and re-localization may well cause large population numbers within given regions to become a concern. No truly massive voluntary reduction in human reproduction is visible on the horizon; forced sterilization is not an option if we hope to maintain our humanity in addition to our survival as a species. Ethical problems also abound when considering issues of the quality of life for people currently dependent on industrial medical technology for survival or comfort. However, *none of this* eliminates or invalidates our previous scientific findings. Ethical problems do not cancel out physical realities, they only inform our decisions. Additionally, the vast majority of people on this planet benefit from industrial technologies considerably less than the minority of relatively wealthy, first world populations. Millions of subsidence farmers, let alone indigenous peoples trying to stave off industrially driven encroachment onto their land, would most likely see an immediate improvement in the quality of their living from the near-term collapse of industrial civilization.

So if, as I hope to have adequately shown or at least indicated, the purchasing of specific "green" products will not get us out of this mess, what might? Unfortunately the individual decision *not* to purchase specific items won't in and of itself do much good either. The issue is not so much one of individuals making quantitative personal changes *despite* the larger industrial economy, but rather one of qualitative societal change that necessarily includes *confronting* the industrial

[17] Dir. Conford M and Zaccheo M. River People: Behind the Case of David Sohappy. Filmakers Library, 1990.

economy. A simple multiplication of this effort into a mass boycott of manufactured goods by consumers is so unlikely as to hardly be worth consideration (and even if this course of action were possible, it would in and of itself not likely accomplish much more than simply wrecking the capitalist economic system as we know it, leaving industrial productive capacity fundamentally intact — the same problem integral to historical 20th century socialism).

Similarly, a much more comprehensive, best-case scenario type program devised to facilitate the easiest transition from our current state to a post-industrial one might be fun to guess at, but would stand very little chance of gaining wide support. The analysis that this piece presents hovers uncomfortably somewhere in between the wildly disparate realms of scientifically established fact and socio-politically viable action. The usual means of effecting societal change seem ill suited to our task.

Realistically we may be faced with the need to research plans for the replacement of industrial practices that can be implemented in times of crisis at the local scale and then rapidly scaled-up to meet larger and larger demands. For example, people living near dense second or third-growth forested areas might want to take the time now to calculate the number of trees per square acre that could be removed from those areas before reaching an appropriate density for future old-growth status. This information, when coupled with population statistics and considerations such as weather patterns and cooking habits would then indicate to what degree wood fires could be relied upon in an environmentally sensitive and sustainable fashion, or if some other fuel source might need to be found, in the case of loss of electric power and other utilities. Another example of a helpful activity would be determining the best means for a given population to secure clean water in the case of powered municipal infrastructures being disrupted. Instructions for where and how to gather and store freshwater or how to construct stills or filters for purification could be drawn up.

An excellent manual which touches on many general considerations for post-industrial living is Aric McBay's *Peak Oil Survival: Preparation for Life After Gridcrash*. Local researchers could use this work as a basic template to be completed by generating and attaching location-specific supplemental materials. These could then be translated into the major languages spoken in a given region (for example Spanish, Russian, Vietnamese and Chinese where I live), and distributed to easily accessed community centers like libraries, churches, etc. Free workshops could also be designed around these materials.

Due to the erosion of natural biological and environmental integrity we are increasingly likely to see the kind of "natural" disasters that would make the implementation of these plans perhaps even a welcome development.

Industrial irresponsibility aside, the city where I live, as well as several others along the West Coast of "North America" are situated near a major tectonic fault line that is due to "slip" any time now. When this happens it's likely that an immensely destructive earthquake will to a large extent decimate these cities. In effect, half the work of doing away with industrial civilization in these areas will have already been accomplished, and if we are not poised to take whatever advantage of this situation we can, a major opportunity for advancement towards true sustainability will have been lost. Comparable future 'disaster' scenarios should be taken into account in other locations as well.

Of course the dire nature of our situation means that we can't afford to put all of our eggs into one basket, specifically one that requires waiting for outside, sadly less-than-ideal situations to develop.

Engaging with a proactive social movement, for example, does have some obvious advantages. Of the current better-known movements for sustainability that we might interact with, permaculture is probably one of the least compromising and most influential. Started in Australia in the 1970s and having spread all over the world in the time since, permaculture emphasizes a set of basic design principles that are broad enough to help guide the design and construction of a wide range of systems, both physical and social. Some of the horticultural and farming techniques pioneered by permaculturists might also prove to be extremely helpful when dealing with challenges presented by our current population numbers. For an up-to-date introduction to permaculture, see David Holmgren's *Permaculture: Principles and Pathways Beyond Sustainability* or his website *permacultureprinciples.com.*

Others argue that the severity of our situation demands not only a proactive, but also a specifically militant response. For a survey of discussions on confrontational anti-industrial tactics, see for example Jensen, Keith and McBay's very comprehensive *Deep Green Resistance*, Best and Nocella II's *Igniting a Revolution* or the magazine *Green Anarchy*.

It seems to me that the best we can do now is to commit ourselves to an honest appraisal of our situation and to a dignified assumption of our responsibilities. In other words, we have to do the best we can in difficult, sometimes even seemingly impossible times.

Global warming is probably already at this point creating its own positive-feedback loops. That is, warming in some areas thaws normally frozen landscapes which in turn release significant green-house gasses into the atmosphere, this process itself further fueling climate change.[18] Blue water absorbs increasingly more heat from the sun instead of reflecting it like white ice; as a result the rate of arctic warming increases exponentially. Likewise, the grim march of species extinction has taken on a dynamic momentum of its own. What this means is that we have already lost a staggering number of current *and* future battles for conservation – regardless of whatever we might do. The overall war for the survival of humanity as a species and some baseline of biodiversity is, however, one that we might still be able to win.

[18] European Space Agency. Signs of thawing permafrost revealed from space [internet]. 2012 [cited May 2012]. Available from "http://www.esa.int/SPECIALS/Space_for_our_climate/SEMHTAGY50H_0.html"

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The False Promise of Green Technology
2012

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