Capitalism Resource Depletion

An Interactive Qualifying Project Report

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Abstract

The goal of this project was to understand the underlying social and philosophical issues revolving around the current environmental crisis, and then to put that information on public domain, in the hopes of informing the public. In order to do this, it was necessary to do a heavy amount of research into the sociological and philosophical literature, and then try to identify the underlying problem with regards to the relationship between humans and the rest of nature. It has been found that the crisis is deeply rooted with both the way humans interact with nature, and the way it is viewed. As such, it cannot be resolved through mere investment or technological bullets. A website was created in order to best put this information on public domain.

Acknowedgements

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Introduction

As the human species rushes headlong into the 21st century, there is a sense that we might not be able to weather the ecological storm. We are now in the midst of the greatest environmental catastrophe ever witnessed in the history of our species. The environmental problems that now plague us are both vast and varied, and they cover every conceivable area of our now tiny world. The threat of catastrophic climate change, growing volumes of garbage and waste, the depletion of natural resources, and the mass extinction of species now loom over us like an unavoidable dark cloud. Each of these threats are increasing in scale and scope every passing day, and the timeframe with which to correct these problems grows ever more small, quite literally evaporating away as the planet heats up. As the Earth moves ever closer to oblivion, one is left wondering, why is any of this happening?

While there are historical examples of past civilizations bringing about their own demise through their own foolish environmental mismanagement (or lack thereof), nothing they could have done could have possibly brought about the vast amount of destruction that is currently taking place. But with the rise of global capitalism in the 16th century, and the Industrial Revolution in the 18th century, the human species have been able to exploit the planet like never before. The rise of industry, the accumulation of capital, and the commodification of both living and inanimate objects have all been chiefly responsible for the current environmental catastrophe. Thus the question becomes, what is it about the logic of capitalism that results in bringing about untold ecological disasters?

While the damages that have been done by past civilizations were reversible in a matter of generations, the damage being done by industrial civilization is becoming irreversible, not correctable on the timescale relevant to the lifespans of civilizations past and present. The carbon

in the atmosphere is expected to stay for centuries even under the best case scenarios, where they will continue to warm the planet for generations to come. The non-renewable resources, such as fossil fuels, are being rapidly depleted and renewable resources like water and fish are being overexploited. The millions of species that inhabit the Earth with us are now dying off by the tens of thousands, being completely exterminated by the activities of industrial civilization.

What does capitalism have anything to do with all this? For one, capitalism requires unrestricted and perpetual growth in every economic sphere, which requires ever increasing consumption of natural resources. Infinite growth on a finite planet is just simply not possible, and we are fast approaching the limits to growth. But there is more than just exploitation of natural resources; everything also ends up being commoditized. To commodify something means to strip it of all of the qualities inherent in the object or living thing, thus legitimizing its unrestricted exploitation, with the ultimate goal of being profit. The pursuit of profit then becomes the sole reason for existence, and as such the technologies that are developed, far from being tools for improvement of living standards, ultimately end up being an expression of desires and dreams. Thus the technologies being developed today are geared primarily toward production for production's sake, for the expansion of new markets, and for the control of resources that provide the raw material and energy. There is no concern for the cultures and species that are trampled underfoot as this process is ongoing. As far as capitalism is concerned, if they are not contributing to growth or profit, they do not have value.

Thus, unlike the civilizations of the past, the current environmental woes are ultimately a part of a deliberate strategy of maximum exploitation in every possible corner of the globe. The rest of the universe too would probably be trampled underfoot by the rapacious logic of capital, were it not for the limitations posed by the laws of physics, in particular the speed of light and

the Second Law of Thermodynamics. If nothing is done to stem the tide and halt the engines of production, humanity may very well be doomed to extinction, along with millions of other species.

This paper asks a few questions. Namely, what is it about the logic of capitalism that leads to environmental catastrophes, is it something that is particular to capitalism or something with much deeper roots, and what can be done about it. Over the past couple of centuries several groups of people, from Karl Marx to Lewis Mumford, from sociologists to feminists to ecologists, have made attempts to understand the logic of capital. It is from these sources that we will draw our tools of analysis from so that one may better understand our ecological predicament, and our place in it. It is very important that we explore not only the physical reasons for our woes, but also the social reasons for them, because if our problems really our just a result of our social system, then it is just a matter of changing it. It is not enough to change the technologies we use or to rely on market forces, because the technology is just an expression of our social relations and ideologies, and markets help contribute directly to the problem.

Current Predicament

As the 21st century progresses the human race is finding itself teetering on the brink. Global warming, resource depletion, pollution, deforestation, overpopulation, and loss of biodiversity all threaten our vulnerable planet. Already we are beginning to feel the effects of the damages that have been wrought on our planet, in the form of melting ice caps, desertification, and accelerating rate of extinctions. The full effects of the environmental damages as of yet remain to be seen. At the same time, the resources that make modern industrial civilization possible, the fuels, ores, timber, and agricultural outputs, are rapidly being undermined and depleted. Where there were once places lush with life and bountiful natural resources, in their place are now landfills, toxic waste dumps, oceanic dead zones, super-pests, deserts, and a big gaping hole in the ozone layer. But perhaps the most discouraging prospect about all of this senseless destruction is not so much that it is happening, but that there is no evidence anywhere that any of this is going to stop any time soon. If anything the damages are increasing exponentially, despite whatever weak laws that have been put into place to address the issues. The human race is in the process of making this planet increasingly uninhabitable, and at the rate that this destruction is occurring, there is a strong possibility that our civilization, along with the entire human race (and millions of other species), will not live to see the 22nd century. But before one can delve into the question of "why", it is perhaps necessary to delve into the "what" in more detail.

Environmental Destruction

The scope of the environmental destruction that has been wrought on planet Earth is truly and utterly staggering. The pollution generated by industrial civilization is global in scale, for there is no place on the planet that is unaffected by its activities. Nearly every single kind of pollution that could be out there is out there, ranging from landfills, toxic waste, nuclear waste, aerosols, genetically modified organisms, and greenhouse gases. Not only are the wastes of industrial civilization flowing into the world much faster than nature could possibly hope to cope with, but also the sinks that could absorb and mitigate even a fraction of this deluge are either beyond capacity or overexploited. The overexploitation of ecosystems, combined with the excretion of large volumes of pollution and garbage by industrial civilization, is perhaps the principle reason that we are in the midst of the largest mass-extinction event ever witnessed since the days of the dinosaurs.

But where to begin? Certainly one can write entire volumes, each hundreds of pages long, on either one of these catastrophes. It is perhaps best to briefly go over some of what are considered to be by far the biggest problems that we as a species face. As far as environmental destruction is concerned, the biggest problem is the emission of greenhouse gases.

Of the greenhouse gases out there, Carbon dioxide (CO_2) is understood to be the primary culprit for global warming, followed closely by methane (CH_4). Carbon dioxide makes up to 76% of all greenhouse gases in the atmosphere, followed by methane (13%), nitrous oxide (6%), and fluorocarbons (5%)[1]. Carbon dioxide is emitted primarily by fossil fuel combustion, solid waste, and the use of tree and wood products, while methane is emitted primarily by landfills and

[1] "Greenhouse Gas Emissions" US Environmental Protection Agency. http://www.epa.gov/climatechange/emissions/index.html (accessed October 28, 2010).

livestock[2]. To be sure, greenhouse gases are very important for the wellbeing of the planet, especially since they help to maintain a temperate climate. It has been estimated that if Earth did not have any greenhouse gases, the global average temperature would be at least 33 C cooler[3]. Under normal conditions, the amount of greenhouse gases emitted from natural sources would be sequestered away via sinks such as trees and oceanic phytoplankton[4].

The real problem is that most of the emissions today do not come from natural sources, but rather from artificial sources like power plants, cars, planes, landfills, CAFO's (concentrated animal feeding operations, aka factory farms), and deforestation[5]. The amount of greenhouse gases that are now being emitted into the atmosphere is truly unimaginable. Since the Industrial Revolution, the atmospheric concentration of carbon dioxide has risen from 280 ppm to 379 ppm, a full 35% increase over pre-industrial levels[6]. According to the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, in 2005 carbon dioxide levels are far in excess of the natural range of the last 650,000 years, where they fluctuated between 180 to 300 ppm[7]. It is the same with methane, where historically for the past hundreds of thousands of years they fluctuated between 320-790 ppb; they are now at 1774 ppb[8]. And the problem is getting worse and worse with every passing day. In the United States alone, carbon dioxide emissions

[2] Ibid.
[3] Nick Hopwood, and Jordan Cohen. "Greenhouse Gases." University of Michigan. http://www.umich.edu/~gs265/society/greenhouse.htm (accessed October 28, 2010).
[4] "Greenhouse Gas Emissions" US Environmental Protection Agency. http://www.epa.gov/climatechange/emissions/index.html (accessed October 28, 2010).
[5] Ibid.
[6] "IPCC Fourth Assessment Report: Climate Change 2007 (AR4)." IPCC - Intergovernmental Panel on Climate Change. Ed. Rajendra K. Pachauri and Andy Reisinger. 2007. http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html (accessed October 28, 2010).
[7] Ibid.
[8] Ibid.

had risen by 17% between the years 1990 and 2007, and it is projected to continue on growing at a rate of 1% per year[9].

And to top it all off, the carbon sinks themselves are beginning to fail and fade away. The effects of deforestation worldwide only serve to exacerbate our already dire situation. The Amazon rainforest, considered the "Lungs of the World" because they contribute over 20% of the total oxygen in our atmosphere, is currently vanishing at a rate of 20,000 square miles per year[10]. Worldwide the rainforest cover has decreased from 15% of the world's land surface in 1950, to about 6%[11]. Phytoplankton, which inhabit the oceans, are another important carbon sink. But they too are in serious trouble due to the various stresses being placed on them. Since 1950 phytoplankton levels have fallen over 40%, and the oceans themselves have now become a net source of carbon emissions[12].

There is no indication whatsoever that this catastrophic situation will improve, just as the effects of such pollution are only beginning to be felt. According to the 2009 State of the World Report, funded by both the World Bank and the US Army:

> "CO2 emissions are increasing even faster—and the world is warming faster—than the IPCC reported in 2007. Arctic sea ice has declined by about 10% in the past decade, and

[9] "Frequent Questions - Emissions". US Environmental Protection Agency. http://www.epa.gov/climatechange/fq/emissions.html (accessed October 28, 2010).
[10] Leslie Taylor, "Rainforest Facts," Raintree, http://www.rain-tree.com/facts.htm (accessed October 28, 2010).
[11] Ibid.
[12] Gene Fry, "Global Warming, so What?" (lecture, Worcester Polytechnic Institute, Worcester, MA, September 8, 2010).

the Arctic may be ice-free by 2030. Global warming continues to make the oceans more acidic, which creates dead zones and reduces its ability to absorb CO2."[13]

Since the late 19th century, global surface temperatures have increased by 0.74 C[14], and more than half of this warming has occurred after 1979[15]. At current rates of emissions, the atmospheric concentration of carbon dioxide is expected to reach anywhere between 600 ppm to a staggering 1550 ppm by the end of this century, which corresponds to a rise in average global temperatures between 1.8 to 6.4 C later this century[16]. And that isn't even the worst of it. As global temperatures rise, the ice in both the Arctic and Antarctic continue to melt at alarming rates. The ice also holds in large amounts of greenhouse gases from entering the atmosphere. For example, the permafrost in the northern regions contain as much as 2 to 4 times the amount of carbon as all the carbon emitted by humans ever[17]. The melting of this permafrost could very well be one of the tipping points, in which if no action is taken to resolve these issues, then we will reach a point of no return, in which any future policy taken cannot hope to reverse the climate change trend. Indeed, with every passing day the window of time with which to take action is becoming vanishingly small.

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[13] Jerome C. Glenn, Theodore J. Gordon, and Elizabeth Florescu. "2009 State of the Future." *Global Futures Studies & Research by the MILLENNIUM PROJECT*. Millennium Project, 1 Aug. 2009. http://www.millennium-project.org/millennium/SOF2008-English.pdf (accessed October 28, 2010).

[14] "Global Warming Frequently Asked Questions." NCDC: National Climatic Data Center. 20 Aug. 2008. http://www.ncdc.noaa.gov/oa/climate/globalwarming.html (accessed November 2, 2010).

[15] "Global Warming & Climate Change - Frequently Asked Questions" *UCAR: Understanding Atmosphere, Earth, and Sun.* 2010. http://www2.ucar.edu/climate/faq (accessed 02 November 2, 2010).

[16] "IPCC Fourth Assessment Report: Climate Change 2007 (AR4)." IPCC - Intergovernmental Panel on Climate Change. Ed. Rajendra K. Pachauri and Andy Reisinger. 2007. http://www.ipcc.ch/publications_and_data/ar4/syr/en/contents.html (accessed October 28, 2010).

[17] Gene Fry, "Global Warming, so What?" (lecture, Worcester Polytechnic Institute, Worcester, MA, September 8, 2010).

Tragedy of the Commons

While the waste of industrial civilization is flooding right into the natural world on one end, at the same time the material prerequisites for our species, the fuels, ores, water and food, are being overexploited and depleted at the other end. Indeed, every single resource that humans depend on for their livelihood is being depleted at unsustainable rates. Not only are natural resources being depleted at an astonishing rate, but most of the resources that are being consumed are concentrating toward the wealthy nations. The United States consumes more energy and resources than any other people in the history of our species, quite literally freeloading off the entire world and partitioning a full 30% of the world's natural resources[18]. Current policies support the unrestricted use and exploitation of natural resources without limit, thus causing the Tragedy of the Commons. The Tragedy of the Commons, by the way, is a concept introduced by ecologist Garrett Hardin, which basically states that if any resource is held in common by use for all, then it will inevitably be destroyed[19]. At the rate at which natural resources are being depleted, we as a species face impending shortages within the lifetimes of the current generation being born.

If global warming is considered the epitome of our environmental catastrophes, then oil depletion can be said to be the symbol of our natural resources woes, soon to be followed closely by water (and by extension, agriculture). Of the fossil fuels that are currently in use, oil is considered the lifeblood of industrial civilization. While coal jumpstarted the Industrial Revolution back in the middle 18th century, it is oil, with its superior energy quality and ease of

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[18] *The Story of Stuff*. Dir. Louis Fox. Prod. Erica Priggen. Perf. Annie Leonard. *The Story of Stuff Project*. Free Range Studios, 4 Dec. 2007. http://www.storyofstuff.com/ (accessed November 2, 2010).

[19] Robert R. Stewart "Tragedy of the Commons." *Oceanography in the 21st Century-An Online Textbook*. Texas A&M University, 6 Aug. 2007. http://oceanworld.tamu.edu/resources/oceanography-book/tragedyofthecommons.htm (accessed 15 Dec. 2010).

use that dominates the scene[20]. Oil is one of the most versatile substances in existence, providing not only an abundant source of energy, but also providing the basic feedstock for a variety of materials and applications, such as the chemical and the pharmaceutical industries, and most plastics[21]. Oil and its products that modern civilization takes for granted has been formed over hundreds of millions of years, believed to be formed the debris of the various plant and/or phytoplankton that died out long ago[22]. Like the other fossil fuels such as coal and natural gas, oil embodies millions of years worth of solar energy collected and stored by the organisms that lived long ago.

But now, the oil wells are beginning to dry up. Back in 1956 geophysicist M. King Hubbert devised what is now known as Hubbert's Peak, and applied it to both the US and the world oil reserves[23]. He predicted that oil production would peak in the United States sometime in the 1970's, and world production would peak early in the 21st century[24]. And it is turned out that both these predictions are true. Oil production in the lower 48 states peaked in 1970 (with production in Alaska peaking in 1988)[25]. At the same time there is growing evidence that world oil production may have peaked sometime this past decade, sometime around the year 2008[26]. If the full effects haven't been felt yet, this is probably because at the moment the global economy is in a slump and consumption levels are lower than they usually are. But even though world oil

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[20] Peter Tertzakian and Keith Hollihan, *The End of Energy Obesity: Breaking Today's Energy Addiction for a Prosperous and Secure Tomorrow* (Hoboken, NJ: Wiley, 2009), 84.
[21] Ranken Energy Corporation, "A Partial List of Products Made from Petroleum," Ranken Energy Corporation Homepage, http://www.ranken-energy.com/Products%20from%20Petroleum.htm (accessed November 2, 2010).
[22] Craig Freudenrich and Johnathan Strickland, "How Oil Drilling Works," How Stuff Works, http://science.howstuffworks.com/environmental/energy/oil-drilling1.htm (accessed November 2, 2010).
[23] Kenneth S. Deffeyes, *Hubbert's Peak: The Impending World Oil Shortage*, Revised and Updated Paperback Edition. (Princeton: Princeton University Press, 2003), 1.
[24] Ibid. 4.
[25] Gene Cooperman, "Peak Oil in Regions Around the World," Beyond Peak Oil, http://www.ccs.neu.edu/home/gene/peakoil/node1.html (accessed November 2, 2010).
[26] Ace, "World Oil Production Peaked in 2008," The Oil Drum, http://www.theoildrum.com/node/5177 (accessed November 2, 2010).

consumption may have peaked, the demand for oil continues to rise. Now that China and India are joining in the fray, both representing over a third of the world's population and anxious to live the American Dream, world oil supplies are expected to be under pressure like never before. It doesn't help matters when the United States, representing about 5% of the world population, is consuming about 6.9 billion barrels of oil per year, representing about 27% of the world oil supplies[27].

In short, the world oil production is at the highest it will ever be. There is no more oil left to find, save for the few remaining large reserves in the Arctic, where it is estimated that up to 90 billion barrels of oil can be recovered[28]. But, it takes a full 10 years before one goes from a virgin oil field to the first barrel of oil[29], meaning that while it is being developed billions of barrels of oil are being consumed in the background. It is even worse if one wishes to include oil shale, as it is a dirty and energy intensive process, takes even longer to develop, and has vastly inferior energy quality[30]. While oil and other fossil fuels took millions of years to form, in a single instant is being drilled and mined out of the ground, and thrown right into the stratosphere and the oceans, where they contribute to global warming and the formation of the Great Pacific

[27] "Crude Oil Faq's," US Energy Information Administration, http://www.eia.doe.gov/ask/crudeoil_faqs.asp#barrels_consume_year/ (accessed December 15, 2010).
[28] Syed Rashid Husain, "The Age of Easy, Cheap Oil Maybe Getting Over Slowly," Arab news.com, http://arabnews.com/economy/article117312.ece (accessed December 15, 2010).
[29] Kenneth S. Deffeyes, *Hubbert's Peak: The Impending World Oil Shortage*, Revised and Updated Paperback Edition. (Princeton: Princeton University Press, 2003), 10. Remember, the United States consumes about 7 billion barrels of oil per year, and China, India, Russia, and Canada are all rushing toward the arctic. Under these terms, there is just simply no way the last remaining large reserves are going to even stall the inevitable.
[30] Peter Tertzakian and Keith Hollihan, *The End of Energy Obesity: Breaking Today's Energy Addiction for a Prosperous and Secure Tomorrow* (Hoboken, NJ: Wiley, 2009), 111. It is currently estimated that, if the oil used from tar sands were to become a reality, it would take 1 barrel of oil to extract 3 barrels, certainly not any where near enough to be economically viable.

Garbage Patch[31]. It is estimated that in about 50-80 years, all of the oil wells in the world will run dry[32].

Oil is not the only critical resource that humanity is running short on, soon it will be followed by water and agricultural land too. While water is a renewable resource, water tables are now falling on every single continent due to over exploitation and evaporation via global warming[33]. The great Ogallala Aquifer, located in the Great Plains, is being exploited so quickly that it is expected that it will run dry in a few short decades[34]. Such depletion will certainly prove to be catastrophic, especially since the bread basket of the world, such as the corn fields of Iowa and the cattle ranches of Texas, are entirely dependent on the water from the Ogallala Aquifer.

Agricultural land is faring no better either, with the problems being primarily unsustainable agricultural practices and overgrazing, and exacerbated by global warming, deforestation, and increased salinity. One the one hand, the amount of land and resources that are being used for agriculture is truly staggering. It has been estimated that up to 70% of all freshwater supplies is used purely for agriculture[35]. At present, about 40% of the world's land is being used for agriculture and farming[36]. But now, more than 38% of the world's agricultural

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[31]NOAA Marine Debris Program, "De-mystifying the "Great Pacific Garbage Patch," Marine Debris, http://marinedebris.noaa.gov/info/patch.html (accessed November 2, 2010).

[32] Donella H. Meadows, Jorgen Randers and Dennis L. Meadows, *Limits to Growth: The 30-Year Update*, 3 ed. (White River Junction: Chelsea Green, 2004), 90.

[33] "World Water Shortage Threatens Harvests," BBC News, http://news.bbc.co.uk/2/hi/274099.stm (accessed December 15, 2010).

[34] Kally Worm, "Groundwater Drawdown," Academic Computing @ Evergreen, http://academic.evergreen.edu/g/grossmaz/WORMKA/ (accessed November 2, 2010).

[35] M. Ragheb, "Fresh Water Augmentation," Netfiles, https://netfiles.uiuc.edu/mragheb/www/NPRE%20402%20ME%20405%20Nuclear%20Power%20Engineering/Fresh%20Water%20Augmentation.pdf (accessed November 2, 2010).

[36] James Owen, "Farming Claims Almost Half Earth's Land, New Maps Show," December 9, 2005 National Geographic News, http://news.nationalgeographic.com/news/2005/12/1209_051209_crops_map.html (accessed December 3, 2010).

land is seriously degraded[37]. The effects of this degradation is the formation of deserts, where the soil is so degraded that life can no longer live there. Of all the places, Africa is bearing the brunt of the desertification processes, where an area the size of Somalia has become a desert over the past 50 years[38]. Desertification threatens more than a third of the African continent[39], and it is estimated that if current trends continue then the amount of arable land left will only be able to feed 25% of the current population of Africa in 2025[40].

This serious degradation of arable land, both in Africa and worldwide, is coming at a time when the world population is rising to unstable levels. The world population growth rate, although it has peaked at 2.02%, is still growing at a rate of 1.18% every year[41]. This corresponds to the addition of about 220,980 births per day, and about 80 million births per year[26]. Growth rate is fastest in the poorer countries, where they are deprived of even the most basic essentials for life, and have no access to family planning or birth control methods. According to the United Nations, the world population will reach over 9 billion by the year 2050 (for reference, the world population today is about 6.9 billion)[42]. This increase in population will mean that the world food production will have to rise by 50% by the year 2030 to meet the

[37] Patricia S. Muir, "What Is Land Degradation and How Much Agricultural Land Is Affected?" BI301 Human Impacts on Ecosystems, http://people.oregonstate.edu/...muirp/whatdegr.htm (accessed December 3, 2010).
[38] Ben van der Pluijm, "Land Degradation," Global Change Program, http://www.globalchange.umich.edu/globalchange2/current/lectures/land_deg/land_deg.html (accessed November 2, 2010).
[39] Ibid.
[40] "Looming Desertification Could Spawn Millions of Environmental Refugees," Mongabay Environmental News, http://news.mongabay.com/2006/1214-unu.html (accessed November 2, 2010).
[41] "Population Growth Rate (percentage)," UN Data, http://data.un.org/Data.aspx?d=PopDiv&f=variableID%3A47 (accessed December 1, 2010).
[42] "World Population Prospects: The 2008 Revision," United Nations Population Division, 2008 http://esa.un.org/UNPP/p2k0data.asp (accessed November 2, 2010).

increased demand[43]. Likewise, the demand for energy resources will rise by 57% over the next 25 years[44]. The cities will similarly grow much bigger, and it is expected that three-fifths of the world population will be urban by 2030[45]. Most urban centers are near the seas, and this is coming at a time when global warming will cause sea levels to rise dramatically, and wash the cities away. Ultimately, industrial civilization is at its maximum limit. There is no more oil, water, food, or land left to go around. Where resources necessary to feed, clothe, and provide electricity and health care for 9 billion people going to come from?

But perhaps the greatest tragedy behind all this is not so much the fact that we are using up all of our natural resources and excreting the wastes into the environment, nor is it the fact that the population is growing to unsustainable levels. With enough political will and leadership, things like oil depletion, carbon emissions, toxic waste dumps, desertification, and over population can all be solved with a combination of social policy changes, cultural transformation, and ingenious technological innovations. For all the damages that have been caused by industrial civilization, they can probably be reversed and resolved within a few generations, at least for the time being. For example, it has been estimated that Americans waste more than 40% of all food that is consumed[46]. As the wealthier nations consume much more than their share (it has been estimated that if everybody lived like Americans, we would need four additional Earths to support their lifestyles), there is certainly quite a bit of fat that can be cut out,

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[43] Ban Ki-moon, "Food Production Must Rise by 50 Per Cent, Secretary-General Tells Rome High-Level," UN News Centre, 3 June 2008. http://www.un.org/News/Press/docs/2008/sgsm11612.doc.htm (accessed November 2, 2010).

[44] "Energy Strategy For the Future," Energy Star, http://www.energystar.gov/index.cfm?c=business.bus_energy_strategy (accessed November 2, 2010).

[45] "The World Goes to Town," The Economist, May 3rd 2007 http://www.economist.com/node/9070726?story_id=9070726 (accessed December 1, 2010).

[46] Robert Roy Britt, "Americans Toss Out 40 Percent of All Food," Live Science, http://www.livescience.com/culture/091126-food-waste.html 26 November 2009 (accessed December 15, 2010).

if only the political will and citizen leadership existed[47]. It wouldn't solve all our problems to be sure, but at the very least the worst injustices among humans can be quickly resolved.

But perhaps the greatest tragedy of all is the current mass extinction of species being caused by our civilization. Partitioning 40% of the world's photosynthetic capacity for human uses doesn't bode over so well for the millions of other species that share the planet with us, and as a result they are all beginning to die off[48]. It has been estimated that due to human activities, the rate of extinction is occurring at about 1,000 times the background rate[49], and that 27,000 species are going extinct every single year[50]. Biodiversity is on the decline in every place on Earth, especially in the disappearing rainforests, and it is estimated that if no action is taken, then a quarter of all species now living could be extinct by 2050[51]. The human race is in the midst of the worst mass extinction ever witnessed since the Cretaceous–Tertiary extinction event, which occurred over 65 million years ago, in which the dinosaurs, along with 50% of all plants and animals, perished[52].

This event, the mass extinction of millions of species worldwide, will prove to be the greatest tragedy of our generation, because unlike all the other issues that hang over us, the damages are irreversible and cannot be corrected. Peak oil can probably be solved by purely technical means, and overpopulation can be solved by purely political and social means, while all

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[47] Michael Bicks, Linda Hirsch and Ralph Avellino, *Earth 2100*, DVD, directed by Rudy Bednar (New York: American Broadcasting Company, 2009)
[48] John Bellamy Foster, *Ecology Against Capitalism* (New York: Monthly Review Press, 2002), 66.
[49] Bryan Walsh, "The New Age of Extinction," Time, Apr. 02, 2009 http://www.time.com/time/specials/packages/article/0,28804,1888728_1888736_1888858,00.html (accessed November 2, 2010).
[50] "The Current Mass Extinction," Evolution Library, 2010 http://www.pbs.org/wgbh/evolution/library/03/2/l_032_04.html (accessed November 2, 2010).
[51] Alex Kirby, "Climate Risk 'to Million Species'," BBC News, 7 January, 2004 http://news.bbc.co.uk/2/hi/science/nature/3375447.stm (accessed November 2, 2010).
[52] John Baez, "Extinction," John Baez's Stuff, http://math.ucr.edu/home/baez/extinction/ (accessed November 2, 2010).

the other issues can be solved by a combination thereof. But there is nothing that can be done about the loss of species. No amount of technology, socio-political ideologies, or finger pointing will ever bring them back. The biodiversity of the planet is now being obliterated completely and totally due to industrial civilization, and it will take millions of years to correct. All species on this planet, humans included, are related to each other, and can trace their ancestry all the way back to the beginning of life itself. Thus whenever humans stamp out a species of life, whether directly or indirectly, not only does it convey an extreme sense of arrogance, selfishness, and apathy, but they are also stamping out its history, uniqueness, and any biological services it could have provided to improve the human condition or maintain the biosphere. The organism, with an ancestry extending all the way back to the beginning of life itself, disappears from the universe and is obliterated beyond all recall…forever.

Jared Diamond once remarked that the singular characteristic that allowed humans to become what they are today was not natural resources like oil or iron, nor was it the ideologies and cultures that were generated by societies. Rather it was the biodiversity of the inhabited continents that proved to be the single greatest factor in which societies flourished, and which did not[53]. In particular, Eurasia had by far the greatest biodiversity, and it was this that allowed humans to domesticate the various plants and animals that we as a species depend on today[54]. Every single band, tribe, village, and civilization that has ever existed owes its prosperity and life to the millions of organisms that inhabit the Earth, for without their participation the human animal could not possibly survive.

[53] Jared M. Diamond, *Guns, Germs, and Steel: The Fates of Human Societies*, Later Printing ed. (New York: W. W. Norton & Company, 1999), 140, 157.
[54] Ibid. 168-75.

It is clear that we are currently in the process of using up all of our natural resources, spewing their wastes into the stratosphere, and exterminating all life on the planet. The activities of modern industrial civilization is making Earth completely uninhabitable, and is undermining the conditions for which life is well adapted and human civilizations prospered. At the rate that things are progressing, there is a strong possibility that not only will our civilization collapse and most life on Earth will perish, but that we too will join the dinosaurs among the long list of organisms that have gone extinct.

With all of the seemingly insurmountable problems that humanity face, one is left to ponder how we are even in this mess in the first place. To identify the source, it is important to note that humans do not operate in a vacuum; rather there are all sorts of social and environmental pressures on their behavior. Humanity is a social species, and thus its actions, thoughts and beliefs are as much a product of their culture and society as is their intrinsic biological and physical properties. If its social system is relatively benign, then so is their human nature. If their social system is intrinsically destructive, then the humans operating in it will likewise be destructive. The question then becomes, does modern civilization fit all the properties of a benign or a destructive social system?

Capitalism

To start off, capitalism is an economic system that is based almost exclusively on private ownership, in which the means of production are privately owned[55]. The economy is presumed to be autonomous, and the economic freedom for the individual reigns supreme. Economic growth is presumed to be the key to prosperity and salvation. Although there were characteristics of capitalism from the Middle Ages, it was not until 1776 when Adam Smith formally codified its core tenants in his book The Wealth of Nations. It was here that the idea of lassiez-faire (literally meaning "let alone") and the invisible hand was born. Adam Smith upheld the notion that unrestricted economic activity, free from intervention from the state, would lead to freedom and prosperity for all[56]. Ordinary citizens would act in their solely rational self-interest, and by no conscious effort their economic transactions would work to bring greater prosperity for all[57]. Together with the ideology of progress and growth, it is this philosophy that has formed the foundation of modern industrial civilization.

While rational self-interest, progress and growth can be noble ideals, under capitalism they seldom lead to greater prosperity for all. Historically these things have also led to some of the most disastrous social policies ever made. From the total annihilation of all tribes and civilizations of the New World, to the current environmental crisis, the history of capitalism is not without bloodshed, violence, ecocide, and war. Because economic growth is fundamental to capitalism, it has necessitated the exploitation of the entire planet so that the few could increase their individual prosperity. Progress, in particular progress toward more privatized riches (rather

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[55] "Capitalism." *The Capitalism Site*. 2004. http://www.capitalism.org/faq/capitalism.htm. (accessed 16 Dec. 2010).
[56] R.J. Kilcullen, "Adam Smith, Wealth of Nations." *Division of Humanities - Macquarie University*. Macquarie University, 1996. http://www.humanities.mq.edu.au/Ockham/y6402.html. (accessed 06 Nov. 2010).

[57] Ibid.

than social progress), is done at the expense of the poor and the powerless, and more often than not material progress meant the destruction other cultures and the ecosystems that they inhabited. With the ideology of rational self-interest came the ability to forgo personal responsibility and accountability, and thus it became possible either to justify the destruction of the environment under the guise of freedom and growth, or to dismiss the problems as tragic flaws in human nature, and thus not amendable by changes in social policy. Capitalism, with its never ending thirst for economic growth and its aggressive pursuit of individualism, has led directly to overexploitation of natural resources to fuel growth and material progress, and thus to the large volumes of waste that pollute the planet, and ultimately to the endangerment and extermination of the millions of species that share the planet with us.

The problems with capitalism are fundamental in nature, and cannot be solved just by merely regulating the markets, or by "enlightened" rational self-interest[58]. Capitalism requires that all other priorities, needs, and rights to be subordinate to the imperative of economic growth, private property, and the ego of the individual. No amount of laws or policies can be allowed to deviate from this ideal, as the recent history of environmental regulation has shown, and indeed just simply isn't enough to halt, or even slow down the destruction of the planet. To see how and why these problems are systemic it is necessary to go into detail as to how the logic of capital works, and why it leads to a whole plethora of social and environmental problems.

[58] The term "enlightened" rational self-interest is a relatively recent term in modern society, made for the sole purpose of upholding the belief that the "free market" can save us all. On the one hand, it is utterly redundant, because the very idea that people act in their rational self-interest implies that they are already "enlightened". On the other hand, this term is nothing more than a euphemism, used to hide the failure of capitalism to account for, or for that matter even acknowledge, the vast ecological destruction that it is directly responsible for.

Myths of Capitalism

For about as long as humans have coalesced into societies, mythology has played an indispensable role in shaping their social and cultural tenants. Every single society that has ever existed has had a mythology, from which its core inhabitants draw on for guidance and meaning. Modern industrial society is also guided primarily by mythologies and ideologies, despite its claims to objectivity and reason, and despite the fact that it has access to the most powerful tool for understanding the external world ever devised, namely science. For contemporary civilization, capitalism is its prevailing economic ideology, which in itself is further grounded on religious ideologies (most notably Christianity) and patriarchy. It is extremely important to note that capitalism's claim to rationality is largely a myth, since the system itself is profoundly irrational. And like other mythologies and religions, evidence and arguments which would discredit capitalism are either ignored or marginalized, while arguments and evidence that support its cause, even if only superficially, are selected for and naturalized. So now, one must ask, what exactly makes capitalism a mythology? What are the core tenants of this mythology, and how do they lead to things like commodity fetishism and environmental destruction? And, of course, how far is capitalism from physical and social reality?

Before the discussion of capitalism as mythology can begin, it is first necessary to define what mythology means in the first place. First off, the word "myth" is derived from the Greek word muthos, which quite literally means a story[59]. It is a story about many things; it is a story about the origin of the universe, the livelihoods and intentions of the gods/goddesses (or spirits)

[59] Paranie, Catalin. "Plato's Myths (Stanford Encyclopedia of Philosophy)." *Stanford Encyclopedia of Philosophy*. 2009. Web. 14 Nov. 2010. <http://plato.stanford.edu/entries/plato-myths/>. It is important to note, however, that the Greeks thought of myths as "true" stories, as opposed to today where we think of myths as falsehoods or failed hypothesis about the world in general.

that created and populate it, and the purpose of it all. But most importantly, it is also a story about the role that humans, animals, and plants play in the cosmos, and their ultimate destiny. As Daniel Quinn eloquently puts it in his novel Ishmael, and through the character, who is a gorilla named Ishmael, it is very much a story, or explanation if you will, of "how things came to be this way", and about the destiny of the human species[60]. Thus, a mythology can be seen as a proverbial stage, in which humans are often set as the main characters, while the surrounding world serves as either a set of extras, props, or just merely details. It is from a range of myths, or stories, that all humans find the meaning of their lives, and a coherent vision of the world that is, for the most part, subordinate to the prevailing world view.

So now, how does capitalism fit into all this, what makes it a mythology, and how close (or far off) is it to being an actual description of how humans behave, or the nature of the external world in which it operates? Much like Christianity, Islam, Hinduism, Greek mythology, Nazism, etc., capitalism too has a set of stories regarding the nature and role of the human animal, the origin and structure of the universe, and the purpose of it all. It is a set of stories that the modern day priests, the economists, recite and propagate, and which the mere mortals at the bottom adhere to and draw upon for their inspiration and the ultimate answers to the questions regarding the meaning of life. Like other mythologies and religions, it is laced with both facts and falsehoods, and ultimately serves as the prevailing ideology of our civilization.

It is important to note that mythology is not really about truth or lies, as is commonly understood, but rather how the facts (or falsehoods) are purposely structured, and whether or not it is useful. All stories that societies tell for themselves have both facts and myths in laced into

[60] Quinn, Daniel. "2, 4." *Ishmael*. New York: Bantam/Turner Book, 1995. 40, 69.

them, and some are more factual than others. To be sure, Jesus probably did exist, even if all of the miracles attributed to him require extraordinary evidence. Troy was indeed a real city[61], as described in the Homeric epics, and it is true that the Earth goes around the Sun, as Corpernicus rigorously derived over 500 years ago, and proven by Galileo and Kepler. Since there is an overwhelming amount of subjectivity involved in the perception of reality, as manifested in various mythologies, there are few, if any, "right" or "wrong" stories; rather they are either "useful" or "not useful", depending on context[62]. For example, the idea of the "American Dream" is particularly useful for the ambitious middle-class college student, but not so for the nations and indigenous people being trampled upon by the American war machine who help make it happen.

And so, we now go back to the question of capitalism. How is the universe structured within capitalism, and what does the current prevailing economic ideology of the entire world have to say about life, the universe and everything? In order to fully answer this question, it is first necessary to turn to the primary "disciples" of capital; namely, Nobel Laureate Milton Friedman, and his predecessors, Adam Smith and John Locke.

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[61] "Troy VII and the Historicity of the Trojan War." *Mark's Site on The Special Projects Server*. Ed. Mark O'Neil. 18 Mar. 2000. http://projectsx.dartmouth.edu/history/bronze_age/lessons/les/27.html (accessed 14 Nov. 2010). In particular, it is believed that Troy was destroyed and reconstructed several times over the millennia, from the first iteration dating back to 3000 B.C. (Known as Troy I), and the last one ending in the first century B.C. The Troy as depicted in the Homer's Iliad is most likely Troy VIIa, which existed between 1300-1000 B.C.

[62] Thom Hartmann, "The Power of Our Point of View: Older and Younger Cultures." *The Last Hours of Ancient Sunlight: the Fate of the World and What We Can Do before It's Too Late*. (New York: Three Rivers, 2004). 122.

Of the many economic writings that Milton Friedman graced the world's libraries with, he is perhaps best known for his publication of Capitalism and Freedom, written back in the 1960's during the height of the Cold War. It is a synopsis of his (erroneous) world view, and serves as a framework for how the ideal society should be structured. First and foremost, Friedman put forth the argument that the individual was the most important unit of society, and that liberalism emphasized that freedom is the ultimate goal[63]. In particular, it is individual and economic freedom that is the end all and be all under capitalist society, with the role of the state greatly diminished. As Milton put it, capitalism "supported laissez-faire at home as a means of reducing the role of the state in economic affairs and thereby enlarging the role of the individual"[64].

Under this system, the only real role that the government has is to practice a policy of laissez-faire (defined as "let alone" earlier) capitalism, in which they only define the "rules of the game" and protect property rights[65]. What the "rules of the game" are, Friedman decides to leave vague, as he never specifies what he means by this. One can only guess that they are probably non-existent as far as the individual is concerned, unless they relate to property or his immediate self-interest. Indeed, it is Friedman's contention that society has nothing at all to say about what an individual does with his/her freedom; that as far as the (economic) liberal is concerned, questions and problems of ethics is entirely left to the whims of the individual[66]. The individual is assumed to act primarily in their rational self-interest, and it is this that will prevent nasty little things like discrimination or other fantastically destructive behaviors (such as environmental

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[63] Friedman, Milton, and Rose D. Friedman. "Introduction." *Capitalism and Freedom*. 40th Anniversary Edition. Chicago: University of Chicago, 2002. 5.

[64] Ibid.
[65] Ibid. 34.
[66] Ibid. 12.

degradation)[67]. Ultimately, the overriding ethical principle under capitalism would be "to each according to what he and the instruments he owns produces"[68], which stands in contrast to Marx's doctrine of "from each according to his ability, to each according to his need".

Furthermore, all exchanges would be voluntary, so that all individuals who take part in the transaction could maximize their benefits, and at the same time leave out the element of coercion, something which the state would utilize if it were allowed the responsibility of social welfare. In order to allow voluntary exchanges, Friedman contends that all forms of property must necessarily be private, and that individuals must be allowed to either enter or not enter a particular exchange. As far as he is concerned, maximum economic freedom would lead to political freedom, which he defines as "the absence of coercion of man by his fellow men"[69]. He also makes the case that it is necessary that all forms of social welfare programs, be they public housing, industry regulation, social security, licensing for professions (e.g. doctors, teachers, etc.), and so on, be either non-existent or, at best, severely limited[70]. Following the program of maximum individual economic freedom, one can presumably ensure political freedom and the welfare of all (private) individuals, and thus the prosperity of society as a whole.

But just what is Milton Friedman basing any of his claims on? It is here that we can turn to both John Locke and Adam Smith to see where he ultimately derives his ideas. Adam Smith was an economic philosopher who is perhaps best known for his Wealth of Nations, written during the same year that the Declaration of Independence was written. In his book, Adam Smith

[67] Ibid. 108, 118.
[68] Ibid. 13.
[69] Ibid. 161-2
[70] Ibid. 13, 35. Milton Friedman talks more about social welfare between the pages 177-190, where he makes the argument that they should be mostly non-existent, and that wages should be entirely at the digression of the employer, regardless of whether or not it is possible to live off of them.

identifies what he thinks are the fundamental prerequisites for a prosperous society, such as the division of labor and the promotion of free enterprise[71]. It is here where both the "moral" and the "scientific" justification for capitalism is expressed, as it posits that, in Book I, Chapter 11 :

> "Every improvement in the circumstances of the society tends either directly or indirectly to raise the real rent of land, to increase the real wealth of the landlord, his power of purchasing the labor, or the produce of the labor of other people. The extension of improvement and cultivation tends to raise it directly. The landlord's share of the produce necessarily increases with the increase of the produce..... Every increase in the real wealth of the society, every increase in the quantity of useful labor employed within it, tends indirectly to raise the real rent of land. A certain proportion of this labor naturally goes to the land. A greater number of men and cattle are employed in its cultivation, the produce increases with the increase of the stock which is thus employed in raising it, and the rent increases with the produce."[72]

The individual acts primarily in their own self-interest, and their relationships between other people are expressed primarily by their exchanges, whether it is money, or goods, etc[73]. However, unlike Marx, Smith comes to the conclusion that this is desirable and rational, rather than the one of the sources of all social ills, and on the whole completely ludicrous. In order so that exchanges, and by extension personal and societal wealth can be maximized, it is necessary

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[71] Halsall, Paul. "Adam Smith: The Wealth of Nations, 1776 (Epitome)." *Internet Modern History Sourcebook*. Jan. 1999. http://www.fordham.edu/halsall/mod/adamsmith-summary.html. (accessed 15 Nov. 2010).

[72] Ibid. Quoting Adam Smith.

[73] Ibid.

for there to be division of labor, so that one can maximize the amount of commodities produced for exchange:

> "To take an example, therefore, the trade of the pin-maker; a workman not educated to this business, nor acquainted with the use of the machinery employed in it, could scarce, perhaps, with his utmost industry, make one pin in a day, and certainly could not make twenty. But in the way in which this business is now carried on, not only the whole work is a peculiar trade, but it is divided into a number of branches, of which the greater part are likewise peculiar trades. One man draws out the wire, another straights it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving, the head; to make the head requires two or three distinct operations; to put it on is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations, which, in some factories, are all performed by distinct hands, though in others the same man will sometimes perform two or three of them….There are in a pound upwards of four thousand pins of a middling size. Those ten persons, therefore, could make among them upwards of forty-eight thousand pins in a day. Each person, therefore, making a tenth part of forty-eight thousand pins, might be considered as making four thousand eight hundred pins in a day."[74]

[74] Ibid.

Thus, it becomes necessary to overproduce so that they could exchange these goods for things that they do need, such as food and clothing, and thus only have to worry about things immediately concerning themselves. Indeed, it is Smith's contention that people only act in their self-interest, and that this creates the "invisible hand" by which, despite their seemingly selfish intentions, creates prosperity for all:

> "It is not from the benevolence of the butcher, the brewer, or the baker that we expect our dinner, but from their regard to their own interest."[75].

Furthermore, the motivation to overproduce not only comes from the necessity of being able to fulfill their needs, but also to seek out rewards, mostly in the form of money and wages[76]. And so, under capitalism, it is presumed that the production of commodities and the growth of real wealth is the raison d'être of life itself, and the source of all happiness.

The final, major piece of the puzzle comes from John Locke, who was Adam Smith's predecessor, and his role was primarily to naturalize many of the things that Smith puts forth in his Wealth of Nations. In order so that capitalism could be legitimized, it is necessary to show that such things as property and ownership are not just simply a social or political tool, but also that it is an inherent part of the natural/external world. That is, from deducing from so-called first principles, that one can indeed come to the conclusion that the individual is the most fundamental essence of all civilization, and that maximizing freedom in the commons is the best way to obtain life, liberty, and the pursuit of happiness.

[75] Ibid.
[76] Ibid.

John Locke puts forth the argument that ownership of property is a natural right, and that people are entitled to property via their labor[77]. It is act of labor that allows things to be baptized into private property, from otherwise common property. Whether it is working the land, food production, computers, art, etc. labor is the underlying essence behind privatization. As he put it:

> "Whatsoever, then, he removes out of out of the state of Nature hath provided and left it in, he hath mixed his labour with it, and joined to it something that is his own, and thereby makes it his property…For this 'labour' being the unquestionable property of the labourer, no man but he can have a right to what that is once joined to, at least where there is enough, and as good left in common for others"[78].

Thus, the privatization of the natural world can then be legitimized under the pretext of "hard work", something that is unique to the individual. But there is still the question of how and why the external world can even be appropriated, or worked on, in the first place. For this, John Locke invokes the divine in order to legitimize the appropriation of the natural world. He argues that God has given mankind dominion over the entire world to use as he wishes, as is revealed by the various prophets of the Bible[79]. And furthermore, not only is man entitled to the entire world, or for that matter the entire universe, but God has also given mankind the property of reason; as Locke so eloquently puts it:

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[77] Locke, John. "Concerning Civil Government." *Great Books of the Western World.* Ed. Robert Maynard Hutchins. Chicago: W. Benton, 1952. 30.

[78] Ibid.

[79] Ibid. 30-6.

"God, who hath given the world to men in common, hath also given them reason to make use of it to the best advantage of life and convenience"[80].

So now, the implicit assumption is that not only can humans appropriate the world for their own personal ends, but that they are innately rational, via grace from God. In one fell swoop, John Locke instantly reveals the religious and mythological nature behind the Enlightenment in general, and of capitalism in particular. It is also important to note that the use of the terms mankind, men, man, etc., rather than gender neutral terms like humanity, is not accidental, since they also reveal the patriarchal aspect of the mythology behind capital, something the ecofeminists are quick to point out. It is both the religious and patriarchal aspect that Max Weber, a German sociologist who, along with Marx, founded modern social science, alludes to when he discusses the "spirit of capitalism"[81].

Over the centuries, Milton Friedman, Adam Smith, John Locke, and others who have contributed to the Enlightenment and economic liberalism have provided the basic framework that defines capitalism as a mythology. Thus the moral, epistemological, and social pillars of Western liberal society are founded on these assumptions:

1) Humans, by nature, act always and only in their rational self-interest. We know that all decisions made are by definition rational because humans, by grace of God, have been given reason. As well, all humans strive to maximize utility[82].

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[80] Ibid. 30.

[81] Max Weber, *The Protestant Ethic and the Spirit of Capitalism* (Lawrance, KS: Digireads.com, 2008), 5-12.

[82] William A. McEachern, *Economics: A Contemporary Introduction*, 8 ed. (Mason, OH: South-Western College Pub, 2008), 137-38. This assumption is taken for granted by virtually every economist now in existence. This drive is assumed to be instinctive, and as such a truly" free" society would be one that would not suppress this urge. Mysteriously enough, they have nothing to say about the fact that the maximization of utility for the individual often occurs to the detriment of human beings and animals alike.

2) The world, or for that matter the entire universe, was made for the human species, in particular so that reason can be applied to maximize its utility. This means, ipso facto, that humans are allowed to cut trees, build dams, mine minerals, appropriate large sections of the Earth to increase productivity, etc. because these things would all help to maximize the utility of the planet, and thus ensure their prosperity.
3) Private property is a natural right, again because of God. Things and creatures become private property by due virtue of labor being acted on it.
4) The only thing that individuals should be concerned with is their own self-interest, since self-interest will lead to prosperity via the invisible hand. Anything that obstructs the freedom of individuals to obtain maximum freedom, in particular freedom to benefit from the commons, should ideally be non-existent or minimized if they are at all necessary. In addition, since humans are innately rational, they won't do things like partake in massively destructive policies, such as doing anything that might undermine their ability to live (like destroy the environment or deplete natural resources).

But just how valid are these arguments in any case? In discussing the validity of the claims of laissez-faire capitalism, one must first see if the underlying premises are true. Truth in this contexts means whether or not they correspond at all to reality, physical or otherwise. As most of the tenants of capitalism hinge on these assumptions, namely that the choices people make are innately rational, that the world was purposely made for humanity (or more specifically, mankind, since women are often excluded or subjugated), and that private property is a natural right, it is useful to see if any one of those claims are valid.

First, there is the question of whether or not humans are innately rational, as John Locke and others have supposed, and as such are able to maximize utility. In order to determine the validity of this claim it is useful to turn to the work of modern psychology, in particular that of evolutionary psychology. According to the general consensus, while organisms appear to be pursuing maximum fitness, in reality every single one of them, humans included, are just executing behaviors that are already evolved in their brains, whether it is advantageous or not[83]. The behaviors that organisms adopt may have been advantageous for their survival in the particular environment from which they evolved, but for the most part these behaviors are perpetuated regardless of whether or not they make any sense. This is true especially for human beings, and is readily apparent in every single culture and religions that exists. For example, in Greenland the Norse could have decided to adopt a different lifestyle that was better suited for that environment, but because of the "programming" that their culture had on them, they were unable to act rationally even if only to save their lives[84]. As a result, their society collapsed. As far as culture and religion goes, the most important thing is not rational utility, but tradition.

Of course, as far as capitalist society goes, the danger now is that "rational" self-interest and maximum utility have become part of our tradition, to be followed through even though we know for well that it will lead to our self-destruction. More specifically, it is not long term survival that is being maximized, but anything that would lead to short term profits. The rational choice would obviously to be to stop consuming more, but then again humans are not innately rational. Thus, the entire world, and the West in particular, is just following their pre-designed

[83] John Toby and Leda Cosmides, "The Conceptual Foundations of Evolutionary Psychology," in *The Handbook of Evolutionary Psychology*, ed. David M. Buss (Hoboken, NJ: Wiley, 2005), 12-14.

[84] Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed*, Later printing ed. (New York: Penguin Group, 2005), 243-47. In particular, the Greenland Norse were heavily reliant on cattle grazing, which was not a particularly good idea when land was quite limited. They also refused to change their diets, such as relying more on fish or walruses, when it became clear that their lifestyle was unsustainable.

programming, put forth by John Locke, Adam Smith, Milton Friedman, and others, rather than acting on their reason. The only thing different about the West and all the other cultures is that they only have the illusion of rationality, as a system that knowingly perpetuates its own demise can be said to be profoundly irrational. Rationality has become more of an ideology in the West, rather than something that is followed through.

It is important to note that criticism of the supposed rationality of the individual extends much further back, before the advent of modern psychology. Even in the Western intellectual tradition such claims have been debated and heavily criticized, most notably by David Hume. David Hume supposes instead that humans do not, as his contemporaries contended, act on reason, but instead acted on passion[85]. All of our decision making and deliberate actions, as David Hume puts it, is a "slave to passions"; that "reason alone can never be a motive to any action of the will," and also that reason will "never oppose passion in the direction of the will"[86]. This observation is, of course, apparent even to the casual observer. For example, although SUV's are terrible with gas consumption, they are produced and consumed anyway, also thanks in part to aggressive advertising of the automotive industries. The idea of the hybrid car is very much a subconscious desire to keep driving cars, although there is no reason to do so if the cities themselves were either redesigned, or if public transport were more aggressively pursued. Many mainstream environmentalists do not fundamentally oppose the idea of capitalism or modern day consumption habits, simply because the vast majority of them are people who have, in some cases, benefitted from the system. Ultimately, what they are attracted to is the idea of

[85] James Fieser and Bradley Dowden, eds., *Internet Encyclopedia on Philosophy* (Martin: University of Tennessee, 2005), s.v. "Hume: Writings On Religion," http://www.iep.utm.edu/humereli/ (accessed December 14, 2010).
[86] Rachel Cohon, ed., *Stanford Encyclopedia of Philosophy* (Stanford: Metaphysics Research Lab, 2004), s.v. "Hume's Moral Philosophy," http://plato.stanford.edu/entries/hume-moral/#inmo (accessed December 1, 2010).

environmental sustainability, much as most Western philosophers are attracted to the idea of rationality, rather than actually making it happen.

The other claims too can be shown to be quite erroneous. For instance, let us move on to the notion of private property. As per John Locke, things become property when labor is applied to them. But does that really mean that people have a "natural right" to private property in the first place? It is important to note that, for the most part, all of the things that are being modified and transformed into food or commodities did not belong to them in the first place. The coal in the Appalachian Mountains were there for over 480 million years, forming a part of the geological landscape, where they played a vital role in the maintenance of the ecosystem and weather systems before Massey Energy Co. decided to blow it up[87]. It is the same when labor is "applied" to meat, as the meat is the flesh of the animal that also plays a vital part in their biology. This system of privatization, as Marx and Engels argued, is nothing more than a system of robbery[88]. Engels in particular called it an act of huckstering, whereby the products of labor, human or otherwise, are appropriated to the hands of the few, without any regard to either the original owners or the impact on future generations, who no doubt would probably need the services that nature provides[89]. Furthermore, the only thing that even justifies the privatization of nature in the first place is, as the ecofeminist Carolyn Merchant stated, the so-called "Death of Nature"; by rendering the natural world dead, it becomes legitimate to appropriate the rest of nature, including other people, into the hands of the few so that it can be modified at will via

[87] US Geological Survey, "Geologic Provinces of the United States: Appalachian Highlands Province," Geology and Geophysics Science Center, http://geomaps.wr.usgs.gov/parks/province/appalach.html (accessed December 1, 2010).
[88] "Outlines of a Critique of Political Economy by Frederick Engels." *Marxists Internet Archive*. Trans. Martin Milligan. Feb. 1996. http://www.marxists.org/archive/marx/works/1844/df-jahrbucher/outlines.htm. (accessed 15 Dec. 2010).
[89] Ibid.

labor[90]. Thus, private property cannot be considered a "natural right", since on the grand scheme of things the artifacts of nature do not really belong to any one individual in the first place. Even among the Enlightenment philosophers there was disagreement over whether property should be considered a right; for instance David Hume argued that private property cannot be considered a natural right, but at best it can be justified depending on the circumstances[91]. Under the circumstances that modern day civilization is in, such as the fact that global warming threatens the extinction of millions of species and natural resource depletion threatens the deaths of billions of people, private property cannot be justified.

This, of course, takes us directly to the third assumption, that the world was made for humans, more specifically mankind. This assumption is peculiar only to the Abrahamic religious traditions (i.e. Christianity and Islam), since most cultures, such as those of the Native Americans, at least acknowledge that such an assumption is quite pretentious. Since the only way to justify this belief is to invoke the supernatural, this also calls into question as to the nature of God and his existence. Opinions on the existence of God vary, ranging from almost certain to extraordinarily unlikely. However, it is important to note that religion by its very nature is irrational, since all of its beliefs are not based on either reason or the empirical method of thought. The irony of it all is that the empirical method of thought, which is the foundation by which all scientific discoveries of the past have been made, is against the most fundamental principles of the Abrahamic religions, although those very religions claim that they are rational. As David Hume put it in his treatise on Human Understanding:

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[90] Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution: A Feminist Reappraisal of the Scientific Revolution* (San Francisco: Harpercollins, 1980), 5, 193.

[91] Jeremy Waldron, *Stanford Encyclopedia of Philosophy* (Stanford: Metaphysics Research Lab, 2004), s.v. "Private Property and Ownership," http://plato.stanford.edu/entries/property/#3 (accessed December 15, 2010).

> "Our most holy religion is founded on Faith, not on reason; and it is a sure method of exposing it to put it to such a trial as it is, by no means, fitted to endure"[92].

Of course, he was hardly the only critic of religion, nor was he the first one to discover the irrationality of it. William of Ockham, a medieval theologian, formulated a principle known as Ockham's Razor to show specifically that belief in God is irrational, that the only way to the divine is by faith and not by reason[93]. Karl Marx considered religion the "opiate of the masses"[94], while modern day critics such as Richard Dawkins consider it a form of delusion[95]. It stands to reason that if the divine does not even exist in the first place, then the claim that private property and the dominion of nature is a God-given right is an outright fantasy.

But in the grand scheme of things, it does not really matter if God exists or not does not really matter, because the idea that are somehow above nature is completely untenable whether one wishes to invoke the divine or not. First off, there is the fact that humans in general have not really been around all that long in the first place. The earliest appearance of hominids date back to at least 7 million years ago, and homo-sapiens in particular around 200,000 years ago in the African savannah[96]. By contrast, the dinosaurs, though now extinct, were dominant on the Earth for over 160 million years[97]. Horseshoe crabs predate even the dinosaurs, having existed for at

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[92] David Hume, *An Enquiry Concerning Human Understanding* (1772; repr., New York: Dover Publications, 2004), 100.
[93] Paul Vincent Spade, *Stanford Encyclopedia of Philosophy* (Stanford, CA: Metaphysics Research Lab, 2002), s.v. "William of Ockham," http://plato.stanford.edu/entries/ockham/#4.1 (accessed December 1, 2010).
[94] Karl Marx, "A Contribution to the Critique of Hegel's Philosophy of Right: Introduction," in *The Marx-Engels Reader (Second Edition)*, 2nd Revised & enlarged ed., ed. Robert C. Tucker (New York: W. W. Norton & Company, 1978), 54.
[95] Richard Dawkins, *The God Delusion* (London: Bantam Press, 2006), 5.
[96] Jared Diamond, *Guns, Germs, and Steel: The Fates of Human Societies* (New York: W. W. Norton & Company, 2005), 36.
[97] National Museum of Natural History, "What Is a Dinosaur?: Everything You Wanted to Know," Dinosaurs, http://paleobiology.si.edu/dinosaurs/info/everything/what.html (accessed December 1, 2010).

least 300 million years, and even today there are 4 species that are still living, having survived both the Permian-Triassic and the Cretaceous-Tertiary extinction events[98].

Secondly, there is also the fact that, up until very recently, humans did not really play that big a role in the workings of the biosphere. For the most part it is insects, worms, bacteria, and trees that play by far the biggest roles in the basic functioning of the ecosystem. Charles Darwin, for example, famously remarked that the earthworm was the most important creature in the history of the planet, since it plays an indispensible role in aerating the soil[99]. The Amazon Rainforest is considered the lungs of the planet, where they contribute more than 20% of the world oxygen supply[100]. There is also the question of whether or not humans can even set themselves apart because of the use of tools. Lewis Mumford, in his book Myth of the Machine, makes the case that if humans were indeed intended to be tool users then they are laggards, since many of the things that we consider unique to humans, such as architecture, have their counterparts in the animal kingdom (i.e. anthills and termite complexes), where they have been engaged in such activities for millions of years[101]. All this, combined with the utter insignificance of the solar system compared to the rest of the universe, the idea that the Earth belongs to humankind, and in particular to half of the population of that species (men), is completely ridiculous.

There are still more features that characterize capitalism, however. For instance, capitalism and the religion that it is based on, Christianity, is aggressively male. Vandana Shiva

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[98] University of Delaware, "History and Biology," Horseshoe Crab, http://www.ceoe.udel.edu/horseshoecrab/History/index.html (accessed December 1, 2010).
[99] Charles Darwin, *The Formation of Vegetable Mould through the Action of Worms* (London: John Murray, Albemarble Street, 1883), 316.
[100] Leslie Taylor, "Rainforest Facts," Raintree, http://www.rain-tree.com/facts.htm (accessed December 1, 2010).
[101] Lewis Mumford, *The Myth of the Machine: Technics and Human Development* (New York: Harcourt, Brace & World, 1967), 5.

notes that women in general tend to be lumped together with the animals and the rest of nature, especially in capitalist societies, and are thus considered nothing more than either as units of production, or something that is standing in the way of progress and (patriarchal) paradise[102]. In particular, Shiva notes that reductionism, the primary epistemological tool utilize in both science and capitalism, is patriarchal in nature, since it downplays intrinsic qualities and diversity, usually associated with the female, and emphasizes quantitative states and uniformity, usually associated with the male[103]. Of course, as capitalism is based on Christianity, which is a patriarchal religion, it is not very surprising that it would inherit all of its prejudices too[104].

While no doubt the adherents to capital tend to downplay the sexist aspects, such as pointing out that the capitalist societies are more egalitarian than the rest, the problem is manifest in every aspect of society. It is worth noting that women tend to bear the brunt of all of the worst injustices in the capitalist system. For example, they tend to be paid less (the national average is for every dollar the man makes, women makes about 77 cents)[105], and they are often exposed to the worst of the environmental toxins, especially in third world countries[106]. Unemployment rates tend to be much higher for women since their work is often underappreciated, and of the starving people on the planet, more of them tend to be the female half[107]. And it isn't just the human females that are worst affected, but also the non-human females. In factory farms, for example, the female cows and the female chickens are some of the most overexploited and worst abused creatures on the face of the Earth, since they are needed for both eggs and milk (the males are

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[102] Vandana Shiva, *Staying Alive: Women, Ecology and Development* (New Delhi: Zed Books, 1989), 16-20.
[103] Ibid. 23-26.
[104] Hasn't anybody yet noticed that all of the main characters in the Bible, such as Jesus or the Prophets, are all men? Even God is described as male. This, of course, is just the tip of the iceberg.
[105] Laura Fitzpatrick, "Why Do Women Still Earn Less Than Men?" *Time*, April 20, 2010, http://www.time.com/time/nation/article/0,8599,1983185,00.html (accessed December 1, 2010).
[106] *The Story of Stuff*. Dir. Louis Fox. Prod. Erica Priggen. Perf. Annie Leonard. *The Story of Stuff Project*. Free Range Studios, 4 Dec. 2007. http://www.storyofstuff.com/ (accessed December 1, 2010).
[107] Vandana Shiva, *Staying Alive: Women, Ecology and Development* (New Delhi: Zed Books, 1989), 118.

either promptly eliminated or, in the case of cows, confined to cages for veal production)[108]. In the particular case of turkeys, their lives are so controlled that reproduction does not even occur naturally anymore, instead they are artificially inseminated so that they can bring in more life into the planet as the corporations wish, as well as to increase the production of meat as much as possible[109].

As the core tenants of capitalism are both erroneous and ideological in nature, the idea that it is the ideal system of welfare is completely untenable. Since humans do not maximize utility in practice, it means that the whole superstructure on which capitalism is built on, such as free markets and commodification, cannot possibly work as a method to bring prosperity for all. Indeed, it is apparent that capitalism has instead created large disparities between the rich and poor, male and female, and exacerbated the inequalities between the "haves" and the "have-nots" already pronounced from the Neolithic Ages onwards[110]. Because capitalism is founded on fundamentally incorrect assumptions regarding the nature of human beings and the universe that surrounds it, it stands to reason that it can be considered a faith, much like the religion it is based on, namely Christianity. As such, capitalism can be said to be a heavily ideological and mythological, much like the Bible and the Greek and Hindu gods/goddesses. It is very much a story about the origins and purpose of the universe, and the ultimate destiny of humanity. The story can basically be summed up like this: the world was made for humans, in particular men! With the capacity for reason, they were to maximize utility and turn the planet into a paradise.

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[108] "Veal : A Cruel Meal." *British Meat*. 2010. http://www.britishmeat.com/veal.html (accessed November 28, 2010).

[109] "Factory Poultry Production." *Farm Sanctuary*. 2010. http://www.farmsanctuary.org/issues/factoryfarming/poultry/ (accessed November 20, 2010). In particular, read this http://www.as.nchu.edu.tw/lab/5c/course/production%5C2007Lecture2.pdf, as it describes in detail how artificial insemination is done, so that production can continue despite injuries.

[110] Jared Diamond, "The Worst Mistake in the History of the Human Race," *Discover*, May 1987, 64-66.

All other things can be considered a means to that end, whether it is rocks, fossil fuels, mineral ores, species, and even other people.

Problem of Science

For the past 400 years, modern science has evolved concurrently with the rise of capitalism. And in the past 200 years, since the dawn of the Industrial Revolution, modern science has been largely applied to improve the conditions of production and commerce. Since it is used directly to support the existing social order via technology, it stands to reason that science does play a role in the current environmental crisis. The problem of science is that it has no provision whatsoever for ethical or moral considerations. Because of these problems, science can be shown to be quite limited when questions revolving around ethics arise, especially with respect to environmental ethics. While it is true that science has allowed humanity to better understand the world, it has also been used to support the most absurd ideologies, capitalism included. At the same time, it has undermined every other tradition of knowledge and ethics, and thus is unable to provide any real way to motivate people to take action against the worst injustices. The problem of science, thus, is very much a problem of the question of the acquisition of knowledge, for it gives credence to the saying "ignorance is bliss"; for every gain we have made in understanding the real world (especially in the biological sciences), the less resolve we have for upholding moral values, traditional or otherwise.

The first problem with science, that there are no moral or ethical considerations, is one that has largely to do with the way that it is used. While science is the best method, and arguably the only method, humanity has for objectively understanding the external world, that does not mean that it does not have its limitations or does not lead to problems. To begin with, science is

reductionist in general. It reduces everything to a few quantities and qualities, and it has the tendency to leave out other considerations, such as aesthetics or morality. As far as science is concerned, the best and the only way to explain things, is by finding the underlying mechanism(s) of it all. Everything is assumed to be corpuscular and atomistic, and everything is the sum of its parts[111]. The problem is particularly acute in Newtonian mechanics, as it is a science that, as John Bellamy Foster put it, "knows only locomotion, and locomotion is both reversible and qualityless"[112]. Because of its tendency to strip away the inherent qualities of particular things or people, it also cuts out any possibility of moral restraint regarding their exploitation. The assumption that everything is reversible further dulls the conscience, as it implies that if any harm is done, it can, through modification, be brought back.

Before the Scientific Revolution of the 16th century, the world was viewed much differently than today. For one, the world was seen as something that was alive, and as such was described in organic terms. Nature in general was anthropomorphized as “female”, seen as a nurturing mother that provided humankind all of their needs in a “planned universe”[113]. The Earth was seen to be in the center of the cosmos, as per Ptolemy, and various geographical features were often also described in organic metaphors[114]. For example, the geographical features that harbored important minerals and metals that society needed for its tools and weapons were often compared to the uterus, and as such miners were often seen observing strict rituals, such as cleanliness, abstinence, and fasting before sinking a mine[115]. This view gave most

[111] Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution : A Feminist Reappraisal of the Scientific Revolution* (San Francisco: Harpercollins, 1980), 228.
[112] John Bellamy Foster, *Ecology Against Capitalism* (New York: Monthly Review Press, 2002), 50.
[113] Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution : A Feminist Reappraisal of the Scientific Revolution* (San Francisco: Harpercollins, 1980), 2.
[114] Ibid. 4.
[115] Ibid.

peoples on the planet, including Europe until at least the end of the Renaissance, the idea that everything, even the lowliest rock, was alive and animate[116].

The imagery of the Earth as a nurturing mother provided a powerful moral and cultural restraint regarding the use of ecosystem services and metallurgy[117]. The organic image served as a subtle ethical sanctions, "ought" and "ought-nots", that would serve to prevent actions that would potentially undermine their ability for sustenance[118]. Because of the organic world view, the operations of societies and civilizations were often low impact due to ethical constraints, and natural resource consumption rates were not anywhere near that of today. The landscape often took thousands of years to alter, and although the ancient civilizations and societies were not completely free of natural resource mismanagement, the organic world view at least prevented any catastrophic and irreversible ecological damage from occurring[119]. Up until modern times, it was just simply assumed that one just does not over-consume natural resources and litter the planet by due fact that it would have been seen as disrespectful.

That all changed in the 16th century, when the organic world view was completely thrown out in favor of the reductionist world view. Beginning with Copernicus, the old world order was systematically deconstructed and reformulated via mathematics. All organic and animistic assumptions were promptly removed, and thus leading to what Carolyn Merchant terms the "Death of Nature"; Nature is rendered lifeless and inert, and thus eliminates any moral restraint

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[116] Carolyn Merchant, *Radical Ecology: The Search for a Livable World (Revolutionary Thought and Radical Movements)* (New York: Routledge, 1992), 42.
[117] Ibid. 43.
[118] Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution : A Feminist Reappraisal of the Scientific Revolution* (San Francisco: Harpercollins, 1980), 5.
[119] This is only in general however, since there are instances of past societies utterly annihilating their environment. Easter Island is the prime example of this trope, where they have overexploited the trees to such a degree that the island remains barren to this day.

for its exploitation[120]. Francis Bacon, one of the chief founders of the philosophy behind modern science and the originator of the concept of the research laboratory, would thus see it fit to appropriate the elements and organisms of the planet for human use and to utilize the experimental method in order to wrestle the secrets of nature[121]. Nature was beginning to be seen as something that could be dominated and controlled, thus legitimizing the exploitation of resources via technology[122]. Thus, this set the stage for the rise of modern industrial civilization, characterized by the exploitation of natural resources beyond capacity and the deluge of pollution that threatens the livelihood of all species on the planet.

It is important to note that the anthropomorphization of nature as female did not go away however; rather it was used quite differently. Instead of a nurturing mother, nature was seen more like a woman to be raped and subjugated via science and technology[123]. As Fritjof Capra put it, quoting Francis Bacon,

> "Nature, in his view, had to be 'hounded in her wanderings', 'bound into service', and made a 'slave'"[124].

Furthermore, she was to be constrained, with her secrets tortured out of her via the experimental method and the utilization of mechanical devices[125]. No doubt, this rather violent viewpoint was influenced by the witch trials of the day, since he lived around the time when

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[120] Carolyn Merchant, *The Death of Nature: Women, Ecology, and the Scientific Revolution: A Feminist Reappraisal of the Scientific Revolution* (San Francisco: Harpercollins, 1980), 193.
[121] Vandana Shiva, *Staying Alive: Women, Ecology and Development* (London: Zed Books, 1989), 15.
[122] Ibid. 16.
[123] Ibid. 17.
[124] Fritjof Capra, "The Turning Point," in *The Green Reader: Essays Toward a Sustainable Society*, ed. Andrew Dobson (San Francisco: Mercury House, 1991), 42.
[125] Ibid.

witch hunts were commonplace[126]. This characterization of nature as a slave to mankind set the precedent for the legitimization of its exploitation on a vast scale, where the only purpose of nature is to provide the resources necessary to fuel the growth of industrial civilization. It is for these reasons that Vandana Shiva, a physicist turned ecofeminist, characterizes the aims of modern science in general, and reductionism in particular, as a brutal and violent[127].

Needless to say, capitalism is very much based on this reductionist, mechanistic world view. As forces and phenomenon in the natural world are reduced to numerical quantities, something to be described and manipulated by equations, so are the participants in the global economy. Everything is reduced to a single, universal value, which is the essence of Marx's theory of Commodity Fetishism. Not only are they reduced to a single value, but reductionist logic is also applied over every single aspect of production, such as ecosystem services. As Vandana Shiva puts it:

> "Capitalism is based on specialised commodity production. Uniformity in production, and the uni-functional use of natural resources is therefore required. Reductionism thus reduces complex ecosystems to a single component, and a single component to a single function."[128]

Capitalism can be said to be based on 18th century physics; it does not even make it to the 19th century (let alone the 20th century) since it fails to incorporate the laws of thermodynamics[129]. Under the logic of capital, everything can be reduced to individual units, to

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[126] Ibid.
[127] Vandana Shiva, *Staying Alive: Women, Ecology and Development* (London: Zed Books, 1989), 23.
[128] Ibid. 24.
[129] Martin O'Connor, "Codependency and Indeterminacy: A Critique of the Theory of Production," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology*, ed. Martin O' Connor (New York: The Guilford Press, 1994), 55.

be manipulated at will; as such it tends to eliminate diversity, in particular genetic diversity [130] as is the case with Monsanto's soybean or the super-trees that are used to fuel the logging industries[131]. The whole of society is the sum of its economic units; namely the individuals who, through exchanges and barter, bring prosperity to society as a whole. Despite advances in modern science that show otherwise, economists still stubbornly cling on to the claims and ideas that originated during the Enlightenment. As the Enlightenment replaced "Nature the Organism" with "Nature the Machine", and combined with the notion that dominion over nature was a God-given right, the economists past and present saw it fit to view the world solely as a machine designed specifically for humankind to use and abuse as they please.

[130] Vandana Shiva, *Staying Alive: Women, Ecology and Development* (London: Zed Books, 1989), 23.
[131] Anne Petermann, "GE Trees, Cellulosic Ethanol, and the Destruction of Forest Biological Diversity," *Capitalism, Nature, Socialism* 19, no. 3 (September 2008): 48-64.

Karl Marx

Of all the theories out there, perhaps the most comprehensive critique of capitalism ever undertaken is the work of Karl Marx. From around 1843 right up until his death in 1883[132], Marx would write various manuscripts critiquing the capitalist mode of production, in particular the class divisions that arose from the social relations of private property and the accumulation of wealth by the bourgeois. After his death Friedrich Engels would publish the rest of his manuscripts. Together with Engels, Max Weber, and Emil Durkheim, Marx was the founder of modern social science[133]. Living in the 19th century, at the onset of the Industrial Revolution, Karl Marx witnessed the rise of capitalism and the subsequent inequalities and environmental damages that it produced. Not one to be deterred, he was a very outspoken critic of capitalism and a strong promoter of socialism and communism. Because of his activism he was soon exiled from his home nation of Prussia, and later found refuge in London[134]. It is in London where he wrote most of his critiques of capital and the promotion of communism. It is in these works where he made his most aggressive assault of the current political economy, and called for the working class, the proletariat, to overthrow the ruling classes and eliminate the class divisions that have plagued civilization from the beginning[135]. In particular, Marx theorized that history is driven by class struggle, and that as time went on, these struggles would culminate into a

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[132] Robert C. Tucker, "The Lives of Marx and Engles." *The Marx-Engels Reader*. 2nd ed. New York: Norton, 1978. Xv-Xviii.

[133] Kim, Song Ho. "Max Weber (Stanford Encyclopedia of Philosophy)." *Stanford Encyclopedia of Philosophy*. 2007. http://plato.stanford.edu/entries/weber/. (accessed 06 Nov. 2010).

[134] Robert C. Tucker, "The Lives of Marx and Engles." The Marx-Engels Reader. 2nd ed. New York: Norton, 1978. xvii.

[135] Jonathan Wolff "Karl Marx," *Stanford Encyclopedia of Philosophy*, " http://plato.stanford.edu/entries/marx/ (accessed December 15, 2010).

revolution, in which the proletariat would overthrow the ruling classes, and eventually form a classless, stateless society[136].

In any event, Karl Marx discussed how capitalism not only exploited human beings, but also the natural world. He discussed it in the context of agriculture, which at the time was only beginning to become industrialized. As agricultural soils became depleted in Europe, it necessitated the importation and exploitation of nutrients from abroad, something that Marx frequently commentated on. But while he did indeed make references to the exploitation of nature, it was very limited. In most of Marx's writings, the exploitation of nature was discussed only in the context of the exploitation of the workers that lived on the land, and it is unclear if he actually had a comprehensive ecological thought. Only Engels shows any evidence of this in his uncompleted manuscripts of the Dialectics of Nature[137]. But regardless, his ideas and tools did prove useful in the development of a comprehensive Marxist ecological critique later in the 20th and the 21st centuries, spearheaded by notable people like Martin O'Connor and John Bellamy Foster.

[136] Ibid.
[137] Howard L. Parsons, ed., Marx and Engles on Ecology (Westport, Conn.: Greenwood Press, 1977); selections.

Commodity Fetishism

Marx's theory of Commodity Fetishism is a powerful concept indeed, as it lays the fundamental groundwork for the very logic of capitalism. The commodity can be said to be the basic unit of capitalism, since without it the accumulation of capital, and by extension the accumulation of wealth, would not be practical. But what is a commodity and how does it operate?

The commodity, as it's understood today, is an item that has exchange value, which can be bought and sold on the market[138]. The idea is very simple; if it does not have an exchange value or a use-value, then it isn't a commodity. But, as Karl Marx observed very early on, this very simple idea can have profound consequences for the structure of society and human relationships (and, by extension, the relationship to the natural world). He was one of the first to realize that under capitalism, everything in the universe can potentially be a commodity. Whether it is gold, platinum, wood, oil, people and animals, or even very fabric of space and time itself; all of these can be commoditized in order so that one can be allowed to accumulate wealth and capital. Commodification has the tendency to strip away all of the inherent qualities of an object, living or non-living, and replace them with a universal quantitative value. It is, in essence, a form of reductionism taken to a logical extreme. Mainstream economists would argue that this universal quantitative value, understood primarily as money or currency, is just a medium of exchange, or a store of value, to allow efficient allocation of scarce resources and

[138] Karl Marx, and Robert C. Tucker. "Chapter I. Commodities." *The Marx-Engels Reader*. 2nd ed. New York: Norton, 1978. 302.

ensure the greatest prosperity for the greatest number of people[139]. But even a casual observer can see that money is not just a medium, free from context, but rather a form of social power, as we will soon see.

In order to see what effects commodification has on both the human and natural world, it is first necessary to see how things are commoditized in the first place. As stated before, things that are commodities have an exchange value. So, how does it acquire this in the first place? Marx noted that in the first place, an object or a resource first acquires a use-value via its utility[140]. Utility can be defined in many ways, such as serving basic material needs like food and shelter, or societal services like roads. Everything used to those ends, whether it be natural resources, such as iron or timber, or services, such as farming or telecommunications, all of the useful things produced and acquired by society has a use-value associated with it.

But a produced thing's use-value does not necessarily translate to exchange value. Before it can obtain an exchange value it needs something more. Here once again Marx gives his insight as to what makes things acquire an exchange value, and thus its birth as a commodity. The thing that gives it exchange value is the amount of labor put into it; more specifically, the labor-power put into the item, resource, or service[141]. While the qualitative properties of the thing, which define its use-value, can be extraordinarily difficult to quantify, the same isn't so with labor-power. Labor-power can easily be quantified via the amount of time it takes to process or modify

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[139] "Economics A-Z | Economist.com." *The Economist - World News, Politics, Economics, Business & Finance*. The Economist, 2010. Web. 07 Nov. 2010. <http://www.economist.com/research/economics/searchActionTerms.cfm?query=Money>.

[140] Marx, Karl, and Robert C. Tucker. "Chapter I. Commodities." *The Marx-Engels Reader*. 2nd ed. New York: Norton, 1978. 303.

[141] Ibid. 306.

something[142]. As Marx so eloquently put it, the use value is defined "Plainly, by the quantity of the value-creating substance, the labour, contained in the article", but "The quantity of labour, however, is measured by its duration, and labour-time in its turn finds its standard in weeks, days, and hours."[143].

The amount of time it takes to process or modify something is dependent entirely on the technology available at the time, or the particular features of a natural source. It stands to reason that the better technology one has at their control, the easier it is to make more commodities in a shorter amount of time. Marx gives the example of the introduction of the power-loom in England, where it reduced the amount of time and labor it took to weave a quantity of yarn by one-half its original value[144]. But of course, other examples abound, ranging from the improvements of drilling machines for the purpose of digging deeper wells for the extraction of ever greater amounts of water and oil, or the use of computers to process large quantities of data in the shortest amount of time possible. It is this labor-power, whether supplied by the hands of humans or machines, that gives it its exchange value, and thus becomes a commodity. Marx makes it clear that a thing or a person (or animal) can have a use-value without it becoming a commodity, for a thing can be useful but transfer no exchange value; for it to become an commodity, "a product must be transferred to another, whom it will serve as a use-value, by means of an exchange"[145]. It is with this that labor-power can be quantified and measured, and thus the value of something can be determined for economic use.

[142] Ibid.
[143] Ibid.
[144] Ibid.
[145] Ibid. 307.

So, now with the infusion of labor in general, and labor-power in particular, we have a commodity. But one is compelled to ask what the point of all this is in the first place. Why are they useful, and to what ends do they serve? Marx pointed out that the ultimate goal of this was to create surplus value, i.e. profit[146]. In order to produce a commodity, and thus surplus value, one must first supply the capital in order to do it. Thus money is invested in human and animal labor, machinery, etc. All of this in effect is used to create a commodity. The commodity is then sold off for a profit, thus closing the loop and creating what Marx would call the M-C-M circuit, where M stands for money and C is the commodity in question[147]. This stands in contrast to the more intuitive C-M-C circuit, where a commodity is produced in order to make money, which is then invested to obtain another one. But of course, the circuit M-C-M would be quite absurd, because money in and of itself cannot fulfill any particular material need, as one cannot eat money. Money, of course, serves a social function rather than a physical one, and under this premise the circuit M-C-M is useful to that end. Marx also pointed out that both ends of this circuit, since money by nature is independent of the use-value of the commodity, differ only by the amount/quantity obtained[148]. Thus, the circuit M-C-M becomes instead M-C-M', where M' is the surplus value, and it is this movement that converts the commodity into what we all would call capital[149]. This circuit only serves to perpetuate itself in ever larger cycles, renewing itself with the goal of obtaining ever larger amounts of money. This surplus value, as Marx noted,

[146] Ibid. 332.
[147] Ibid.
[148] Ibid.
[149] Ibid. In particular, one needs to remember this surplus value came from exploited labor; the labor was often not voluntary, because in practice the workers were only paid just enough to eat.

becomes an end into itself, where the sole purpose of a commodity is to make a profit, independent of any particular qualities or use-value it may possess[150].

It is the exchange value, and the subsequent surplus value that it promises, that a commodity begins to take a life on its own. When things are commoditized it gains additional properties other than the physical properties or utilities that it originally had. Marx so eloquently pointed out the mystical qualities that commodities obtains when labor-power is applied to it:

> "A commodity is therefore a mysterious thing, simply because in it the social character of men's labour appears to them as an objective character stamped upon the product of that labour"[151].

It is the social relations in the production of an item that give it the property of a commodity, in particular when these social relations manifest themselves onto things. These social relations act as if they are also part of an object's physical nature, when in reality they have no connection to their physical properties or their material relations arising from them whatsoever[152]. It is when the things that are produced are endowed with a life of its own, via the social relations of production and ownership thereof, that Karl Marx calls the Fetishism of the Commodities[153]. Under this, the commodity becomes the sole means of social relations, whether through its production or its exchange, or rather it only reveals itself via exchange[154]. It is this fetishism that strips the inherent qualities of particular objects, whether they are physical or aesthetic, and thus it becomes possible to assign a universal quantitative value to them.

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[150] Ibid. 333.
[151] Ibid. 320.
[152] Ibid. 321.
[153] Ibid.
[154] Ibid.

Under this system, there is no difference between, say, a car, few tons of soybeans, or 200 textbooks, as long as the exchange values are the same[155]. Exchange value thus becomes its raison d'etre, and if something doesn't have an exchange value, then capitalists will assume that it has no value at all. With a system like this it can be seen why capitalism cannot account for the massive environmental damage that it is causing, nor can it stop itself from undermining the conditions of its own existence. It is under this worldview that we see why politicians and economists just shrug when they hear that their activities are wiping out species, eliminating indigenous cultures, or overexploiting natural resources, because if these things cannot be exchanged for profit or take part in the market economy, then they have no value. They need not concern themselves with silly notions like stewardship or accountability if these things do not generate surplus. It is this concept that forms the bedrock of a Marxist ecological critique of capitalism, and at the same time exposes the irrationality of the current political economy.

[155] Ibid. 319. Karl Marx gives the example of linen and coat, and bushels of corn to the quantity of watches. But the principle is still the same.

Ecological Marxism

While Commodity Fetishism is the lynchpin of the capitalist mode of production, there are still more absurdities and contradictions to be found within capitalism. Indeed, not only does capitalism reveal contradictions between classes, the contradictions are also apparent in the relationship between humankind and nature. For instance, the contradiction between capitalism's demand for perpetual growth vs physical limits. It is ultimately linked to the mode of production, the ownership of production, and the overall nature of commodities. Of the many theorists out there, none have been more vigorous in the application of Marxism to critiquing this parasitic relationship between capital and nature than John Bellamy Foster. Other people, such as Martin O'Connor, focused mainly on the contradictions between perpetual growth and the physical limits of our planet, in particular the contradiction between the mode of production and the laws of thermodynamics. John Bellamy Foster takes a more general approach and focuses on the end results, and makes the case that while capitalism is certainly undermining its own conditions for existence in the long run, it can, at least in the short run, continue to grow even larger amidst the vast amount of destruction and chaos that surrounds it, and despite rapidly depleting resources.

Before one can fully comprehend the scope and the scale at which capitalism creates these ecological disasters, it is first necessary to look at the fundamental source of them, namely the contradictions between the relationship between capitalism and nature. Thus we will begin our discussion with the work of Martin O'Connor, whose work encompasses the nature of the contradictions themselves, and uses physical arguments against them. To be sure, it is the physical arguments that best show both the absurdity and arrogance of the ultimate aims of capitalism, and will eventually prove to be its undoing. It is important to note that unlike the laws that are legislated and debated in Congress, physical laws are fundamental to the universe itself,

and cannot be repealed. Nor can they go away by ignoring them, no matter how desperately one wishes to do away with them, like the current attitude of the US government towards global warming. It stands to reason that, as Marx noted long ago with the crisis in capitalist agriculture[156], that the physical laws have the most profound social consequences too.

Martin O'Connor points at two fundamental sources of contradiction between capitalism and nature: the first being that the planet is materially finite, and the second one being that capital does not control, and for that matter, cannot control the natural conditions of production[157]. The reasons for this are simple to understand, namely that it is physically impossible to have perpetual growth on a finite planet, and thus the natural conditions on which production can occur are unalterable. In order to understand the fundamental reasons for this, it is necessary, as Martin O'Connor has done, to turn to the laws of physics, in particular the laws of thermodynamics. To be sure, thermodynamics was originally developed in part by industrialists who hoped to understand the fundamental energy principles that made their machines run, as it was their preoccupation to get their men and machines to do "useful work"[158]. But time and again science has proven to be double edged sword; just as it produced results that resonate so readily with the prevailing ideology, it too produces results that go against it completely and totally, as the development of modern ecological science and quantum mechanics clearly demonstrate.

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[156] Karl Marx,. "Capitalist Pollution and Ruination of Nature." *Marx and Engels on Ecology*. Ed. Howard L. Parsons. Westport [Connecticut: Greenwood, 1977. 174-75.

[157] Martin O'Connor, "Codependency and Indeterminacy: A Critique of the Theory of Production," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology* ed. Martin O'Connor (New York: The Guilford Press, 1994), 55.

[158] Ibid. 59.

As O'Connor so eloquently put it:

> "The fact that thermodynamics is a product of industrial society lends it a double-edged pertinence: first, as a tool of ideology, and second (as I will try to employ it) as a tool of immanent critique".[159]

But what is it exactly about the laws of thermodynamics that work to place harsh limits on economic growth? The first law is basically a confirmation of the conservation of energy; that energy can neither be created nor destroyed, it can only be transformed from one form to another[160]. There is, of course, a more rigorous definition for this, but it is not necessary for the purposes of showing where capitalism goes astray. The second law of thermodynamics is the famous "entropy" law: that all things will necessarily tend toward a state of greater entropy in a closed system[161]. Entropy can be analogous to either "order" or amount of recoverable energy; the greater the entropy, the greater the disorder, and thus the less recoverable energy for a given system there is. All physical processes, no matter what, will contribute a greater amount of entropy throughout the entire universe. The second law is the most important one, because it has profound implications for the limits of industrial civilization and is directly related to the problem of efficiency, although the first one does act to place limitations too.

To be sure, the first law already places limitations on the accumulation of wealth, and thus on the M-C-M' circuit, since all processes have to be expressed in terms of finite energy stocks (like fossil fuels) and flows (wind, solar, etc.). But it is the second law that places the most severe limits on growth, since not only does it place harsh limitations on the efficiency of the

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[159] Ibid. 60.
[160] "First Law of Thermodynamics." *Hyperphysics*. 2010. Web. 09 Nov. 2010. <http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/firlaw.html>.
[161] "Second Law of Thermodynamics." *Hyperphysics*. Web. 09 Nov. 2010. <http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/seclaw.html>.

engines that run the factories (and the energy expended in moving human limbs), but as Martin O'Connor correctly points out, it also implies the irreversibility of such processes[162]. As time goes on, all activity in the universe, including economic activity, will gravitate to the state of greater entropy.

Of course, it is important to note that the second law holds only in closed systems. The more observant would note that the Earth and its ecosystems are an open system, because it receives a constant influx of energy from the sun, which is then utilized by all life, and on every single trophic level. Furthermore, while the entire universe is certainly a closed system, the universe itself is gigantic[163]. It is also very young on cosmological timescales, being only about 13.7 billion years old[164]. Current theories predict that the heat death of the universe is trillions of years away[165]. Certainly, these phenomena occur on scales not relevant to the lifespans of civilizations or even species.

With facts like these, the most careless of economists and scientists might conclude that our energy and resources are effectively infinite. Indeed it is this belief that fuels technological optimism regarding the future of the planet, especially with regards to our energy resources. But unfortunately it is not so, especially since humanity is currently limited to one planet. Furthermore, the huge distances between stars (with the nearest star being 4.5 light years away), and the limitations placed by the speed of light pretty much means that humans are going to

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[162] Martin O'Connor, "Codependency and Indeterminacy: A Critique of the Theory of Production," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology,* ed. Martin O'Connor (New York: The Guilford Press, 1994), 55.

[163] Britt, Robert R. "Universe Measured: We're 156 Billion Light-years Wide!" Space.com. 24 May 2004. 12 Nov. 2010. <http://www.space.com/scienceastronomy/mystery_monday_040524.html>

[164] Wright, Edward L. "Age of the Universe." UCLA - Division of Astronomy & Astrophysics. 15 Dec. 2009. Web. 12 Nov. 2010. <http://www.astro.ucla.edu/~wright/age.html>.

[165] Adams, Fred C., and Gregory Laughlin. "A Dying Universe: The Long Term Fate and Evolution of Astrophysical Objects." Thesis. University of Michigan, 1996. *Reviews of Modern Physics* (1996): 1-57. *Arxiv*. Web. 10 Nov. 2010. <http://arxiv.org/PS_cache/astro-ph/pdf/9701/9701131v1.pdf>.

remain stuck on a single planet for a long time to come. It also does not help that industrial civilization is consuming so much resources that there probably isn't even enough rocky planets and moons in our own solar system to supply the raw materials for exponential economic growth for very long (The Gas Giants are not included since they are mostly hydrogen, and in the case of Uranus and Neptune, ammonia and water)[166].

Because of the scale and the scope at which industrial civilization operates, using the second law of thermodynamics for the critique of capitalism can be done. It is especially effective when critiquing the amount of energy resources consumed, since it is the critical factor for determining the rate, and the limits of economic growth. For modern industrial civilization, the critical energy sources are fossil fuels, because without them our consumerist society cannot survive. But what about other sources of energy, like solar? Could they possibly pick up the slack once fossil fuels disappear? Although energy resources like solar energy are very plentiful, they cannot possibly pick up the slack once fossil fuels disappear, simply because it is not anywhere near as energy dense[167].

Certainly, the amount of energy captured by the Earth from the sun is estimated to be around $1.8x10^{17}$ Joules/second, or about $5.67x10^{23}$ joules per year[168], far in excess of the amount of energy consumed by industrial civilization per year (about $4.98x10^{20}$ joules per year)[169]. However, the critical factor is not the amount of total available energy, but the Energy Return on

[166] Earth is by far the largest rocky planet in the solar system, followed closely by Venus. However, if the whole world were to live like Americans, we would need 4 Earths to pull it off. All of the rocky planets combined do not quite add up to 4 Earths.

[167] For that matter, nuclear fusion is also problematic, but for different reasons. It is unclear if it will ever play a significant role at anytime this century. As civilization is expected to collapse towards the end of the 21st century, it is unlikely that it will arrive in time.

[168] Eberhard Moebius. "Ask Us--Sun." *NASA's Cosmicopia*. NASA, Jan. 2005. 06 Nov. 2010. http://helios.gsfc.nasa.gov/qa_sun.html#sunenergymass.

[169] "EIA - International Energy Data and Analysis." *U.S. Energy Information Administration - EIA - Independent Statistics and Analysis*. Web. 10 Nov. 2010. <http://www.eia.doe.gov/iea/wecbtu.html>.

Investment (EROI). The EROI determines how much net energy there is available for the rest of society (basically it is a term that describes how much energy it takes to make energy); a lower EROI means that more energy must be reinvested in production, and thus there is less left over for the rest of society[170]. To give an example, an EROI of 1:1 would mean that one has to invest one unit of energy, in order to get the same (thus it is breaking even), while an EROI of 50:1 would mean that only one unit of energy needs to be invested to get back fifty units of energy[171].

In the case of solar power, the limitations placed on efficiency by the second law of thermodynamics (photovoltaic cells are only about 10% efficient)[172] , plus the impracticality of covering the entire planet with solar panels (never mind the effects that would have on ecosystems) pretty much means that almost none of that energy falling from the sun is recoverable. The total amount of solar energy recovered by photosynthesis in the entire United States, for example, is only about 80 quadrillion BTU's per year (for reference, the United States consumed about 100 quadrillion BTU's in 2006, which is a full 25% more energy recovered by all biomass in the nation!)[173]. Furthermore, solar energy (and its offshoot, wind energy) are very intermittent and diffuse, so the EROI of these sources tend to be pretty low compared to that of fossil fuels (less than 10:1 for solar photovoltaic, 20:1 for wind, compared to 100:1 for oil in the 1930's)[174]. It would not be a problem if the electrical system was completely decentralized and

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[170] Peter Tertzakian and Keith Hollihan, *The End of Energy Obesity: Breaking Today's Energy Addiction for a Prosperous and Secure Tomorrow* (New York: Wiley, 2009), 110.
[171] Ibid. 112.
[172] Patel, Prachy. "Giving Plastic Solar Cells an Energy Boost - Technology Review." *Technology Review: The Authority on the Future of Technology*. 16 Mar. 2010. Web. 13 Nov. 2010. <http://www.technologyreview.com/energy/24792/>.
[173] Heinberg, Richard. "Net Energy: Impresice but Essential for Planning." *Searching for a Miracle: Net Energy Limits and the Fate of Industrial Society*. 2009. 1-76. *Post Carbon Institute*. Web. 09 Nov. 2010. <http://www.postcarbon.org/new-site-files/Reports/Searching_for_a_Miracle_web10nov09.pdf>.
[174] Ibid. 28.

localized, but so far most efforts are geared toward making solar and wind emulate a typical fossil fuel power planet.

Using physics alone one can show that when fossil fuels are depleted, the very life blood of industrial civilization, the sources of energy that society will be forced to rely on, like wind, solar, and biomass, will only be able to provide a small fraction of the energy currently consumed. Thus, it should come as no surprise that without fossil fuels, our capitalist society, predicated on infinite growth, cannot possibly survive. It is true that humans are dependent on other critical resources, like water and food, which are also going to be in serious trouble, but it is energy that is the critical lynchpin behind the availability of it all. With enough energy one can always dig deeper mines, desalinate large volumes of water, and increase agricultural yields, as the Green Revolution has shown. But if the energy stocks themselves go, then everything else falls apart too. The energy that has been expended in industrial processes is gone forever, due to the irreversibility of thermodynamic processes. And this, together with the gargantuan wastes produced by our society plus the over exploitation of renewable resources, is the fundamental essence of the first ecological contradiction of capitalism. The very idea that infinite growth could continue indefinitely on a finite world, which most economists would have us believe, is both absurd and delusional.

This, of course, takes us directly to the discussion of the second source of contradiction within capitalism, namely that it can control the natural conditions of production. To be sure, this is an assumption not only held by capitalists, but also by mainstream Marxists and socialists as

well[175]. That traditional Marxism also believed in the controllability of nature has led them to also endorse some of the most absurd choices in field of development the utilization of natural resources[176]. However, this contradiction originated with capitalism, beginning with the Industrial Revolution, and continues to be the driving ideology of modern industrial society today. Combined with the fact that the Left wing governments and movements have been largely defeated over 20 years ago and their influence greatly reduced, it can be said that this contradiction is once again unique only to capitalism.

According to Martin O'Connor, there are three main assumptions that are peculiar to the second source: controllability of a production process, dominance over the environment, and independence of production processes from each other[177]. Each of these assumptions is essential if the corporations are to maximize profits. And there are several instances in which all three conditions can be met, with Monsanto's control of the soybean from the seed to the grocery store being a famous example, where they control everything from the distribution process, right down to its genes[178]. While hardly the only example, it is this success that, as O'Connor points out, fuels the belief that the natural environment is indeed a domain that can be completely controlled, an assumption made by both capitalists and socialists alike[179].

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[175] Martin O'Connor, "Codependency and Indeterminacy: A Critique of the Theory of Production," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology,* ed. Martin O'Connor (New York: The Guilford Press, 1994), 58.

[176] Jean-Paul Deleage, "Eco-Marxist Critique of Political Economy," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology*, ed. Martin O'Connor (New York: The Guilford Press, 1994), 41.

[177] Martin O'Connor, "Codependency and Indeterminacy: A Critique of the Theory of Production," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology,* ed. Martin O'Connor (New York: The Guilford Press, 1994), 64.

[178] *Food Inc.* Dir. Robert Kenner. Prod. Robert Kenner and Elise Pearlstein. Perf. Michael Pollan. Magnolia Pictures, 2008. DVD.

[179] Martin O'Connor, "Codependency and Indeterminacy: A Critique of the Theory of Production," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology,* ed. Martin O'Connor (New York: The Guilford Press, 1994), 56.

However, the main fallacy being made is the assumption that this sort of control is possible on all levels, and that it can be maintained for very long. For instance, GMO seeds often have a nasty habit of contaminating more legitimate agricultural fields, thus directly contradicting the third assumption (i.e. that the production processes are independent). But perhaps the ultimate manifestation of the second contradiction would perhaps be our current global warming crisis. Global warming can be said to be the epitome of what Martin O'Connor calls the "crisis of control"[180], because the phenomenon shows just how utterly ridiculous the notion of the controllability of nature really is. Because the warming of the planet will cause what most scientists consider to be catastrophic climate change, it will affect all conditions of production. For instance, global warming will lead to greater evaporation rates[181], thus affecting agricultural yields and hydroelectric power, striking down both the first (the controllability of a production process) and second assumptions (that the natural environment can be controlled). Still more, rising sea levels will wash away most of the coastal cities and with it, the industrial and economic infrastructure built up over the past few centuries, thus striking down third assumption (independence of production processes). To be sure, there are various geo-engineering schemes, such as gigantic space mirrors and saturating the atmosphere with aerosols, but they are beginning to look more and more like fantasies rather than real solutions. For instance, it is estimated that amount of sulfates needed to stem the tide of global warming would be such that it would require hundreds of flights of big cargo planes, each carrying several tons of sulfates, per day[182]. Climate change, indeed, is the ultimate crisis of control within capitalism,

[180] Ibid.
[181] Gene Fry, "Global Warming, so What?" (lecture, Worcester Polytechnic Institute, Worcester, MA, September 8, 2010).
[182] Ibid.

precisely because it is proving to be uncontrollable and affecting every single industrial and agricultural sector on the planet.

In summary, it is these two sources of contradiction, the first being running headlong into the finite limits of growth, and the second one being the assumption that nature can be controlled, that form the part of the bedrock of Ecological Marxism, and it is around these contradictions that most of the debate occurs. These sources, identified by Martin O'Connor, give credence to James O'Connor's thesis regarding the basic ecological contradictions of capitalism; namely that capitalism has the tendency toward a crisis of overproduction (leading directly to overexploitation of resources and overpollution), and that this leads to underproduction, since it harms its own conditions for existence[183]. Like the classic contradictions of capitalism pointed out by Marx long ago, that of the accumulation of wealth in fewer and fewer hands and the mutually antagonistic relationship between the ruling classes and the proletariat, the ecological contradictions would presumably also motivate the lower classes to act to change the system[184]. Certainly, it is true that natural resource depletion has pretty dire consequences for the global economy, the least of which would cause the price of every single commodity to spike upwards. It is also true that the wastes that are overflowing into the environment will alter both the biosphere and atmosphere in very interesting ways, and will thus put a further strain on conditions of production and consumption.

However, even though the arguments are solidly grounded, there is still room for debate and discussion, especially with regards to how these contradictions affect the social sphere, and

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[183] "Theoretical Notes: On the Two Contradictions of Capitalism." *Cyberbooks*. The Center For Political Ecology, 1 June 2005. http://centerforpoliticalecology.org/Cyberbooks/notes.html. (accessed December 15, 2010).
[184] Robert Drislane and Gary Parkinson, eds., *Online Dictionary of the Social Sciences* (Athabasca: Athabasca University, 2002), s.v. "Contradictions of Capitalism," http://bitbucket.icaap.org/dict.pl?term=CONTRADICTIONS%20OF%20CAPITALISM (accessed December 15, 2010).

the extent at which these contradictions can seriously impact capitalism. It is in this realm that John Bellamy Foster specializes in, and most of his work involves expanding on the consequences of these contradictions, as well as the impact on the system of capital itself. He tends to be skeptical of James O'Connor's claim that the contradictions of capitalism will immediately undercut its own conditions of production.

John Bellamy Foster argues that while it is true that capitalism does undermine its own conditions for its survival, it does not necessarily mean that it will grind to a halt so quickly. He argues that first of all, there is no reason to believe that, at least in the short term, that the massive environmental damage caused will have any noticeable impact on the conditions of production, nor will it cause capitalism to grind to an immediate halt due to lack of resources[185]. The argument for this is because, since capitalism is fundamentally a social system, there isn't a natural mechanism which would cause it to reorganize in the first place[186]. As John Bellamy Foster so eloquently puts it:

> "In other words, the dangers of a deepening ecological problem are all the more serious because the system does not have an internal (or external) regulatory mechanism that causes it to reorganize."[187].

This argument shows, of course, that the ecological problems caused by capitalism can be made even worse than previously imagined. The example he gives for his argument is the mass extinction of species and the thinning of the ozone layer[188]. And in this sense John B. Foster definitely has a point; after all, most of the species being exterminated are not even being

[185] John Bellamy Foster, "Capitalism and Ecology:The Nature of the Contradiction," Monthly Review, http://www.monthlyreview.org/0902foster.htm (accessed November 10, 2010).
[186] Ibid.
[187] Ibid.
[188] Ibid.

accounted for, much less acted against by big businesses. And why not? Well, if one recalls the theory of commodity fetishism, it is probably because since most of these species do not contribute at all to the global economy, they have no value, as far as producing and distributing commodities go[189]. Most of them still remain unknown to biology, and thus take no part in the accumulation of wealth[190]. It is the same with the ozone layer; as far as capitalism is concerned it does not exactly contribute at all to the accumulation of wealth either, nor it is a prerequisite for producing commodities. Thus it is a mistake to assume, as John B. Foster puts it, that these damages will be reflected in the global economy, especially since these damages are considered externalized costs[191]. There are, of course, plenty of other examples, such as the growth of genetically modified trees for biofuel production, where even though the pollen from such trees might render normal ones sterile or poisonous[192], there is no real strain on the conditions of production. If anything, the spread of GE trees in native forests could be seen as an opportunity to increase profits for certain industries, in particular the biofuel and logging industries.

And going back to the GMO soybean example, it is also worth mentioning that Monsanto tends to jealously guard the intellectual rights to the seed's genes, the very essence of life itself. Since contamination is both uncontrollable and unavoidable, this is often used as an excuse to sue regular farmers to oblivion[193], and thus increasing control of the production process and the profitability of the GMO soybean. And it is still unclear whether or not global warming or oil depletion will cause capitalism to come crashing down, especially since the damages will occur

[189] Ibid.
[190] Ibid.
[191] Ibid.
[192] Anne Petermann, "GE Trees, Cellulosic Ethanol, and the Destruction of Forest Biological Diversity," *Capitalism, Nature, Socialism* 19, no. 3 (September 2008): 10.
[193] *Food Inc.* Dir. Robert Kenner. Prod. Robert Kenner and Elise Pearlstein. Perf. Michael Pollan. Magnolia Pictures, 2008. DVD.

over many decades, and will probably result in a phenomenon known as "creeping normalcy"[194]. Yet another example would be that of nuclear waste; namely, the question of whether or how seriously nuclear waste impacts the ability of nuclear power plants to generate electricity used to power the various machines that make society function (and certainly some of which are used to cause even more ecological problems). It is worth noting that mainstream economists themselves, such as William Nordhaus, estimated that global warming, even in the worst case scenarios, will only cause perhaps at most 1% drop in the GNP[195].

So, in many respects, while there are indeed physical limits to growth, this does not necessarily mean that capitalism, and the underlying global market, is going to come to a screeching halt immediately. Nor will it necessarily produce the tensions between classes to the degree that will cause capitalism to even pay attention (which is most obvious in the case of both Greenpeace and the Sierra Club)[196]. In this sense, one can easily make the case that capitalism only has to be viable for just long enough until it undermines the physical conditions for its own existence completely and totally. John B. Foster quotes the German Green Party regarding natural resources and profits, that "the system will recognize that money cannot be eaten only when the last tree has been cut—and not before"[197]. If this is certainly the case, then we are in even more serious trouble than we have realized, because it means that by the time that the contradictions of capitalism really do grind the system to a halt, then it is already much too late; the rising oceans have already swept the coastal cities away, all of the high EROEI fuels are long since depleted, agriculture has been obliterated, and most species are already extinct. Ultimately,

[194] Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed*, Later printing ed. (New York: Penguin, 2005), 425. Basically, this means that since the effects will come slowly, it will give just enough time to make it feel "natural", and thus they would not notice that anything was wrong for a while after the fact.
[195] John Bellamy Foster, *Ecology Against Capitalism* (New York: Monthly Review Press, 2002), 38.
[196] John Bellamy Foster, "Capitalism and Ecology: The Nature of the Contradiction" Monthly Review, http://www.monthlyreview.org/0902foster.htm (accessed November 10, 2010).
[197] Ibid.

while the physical contradictions of capitalism will certainly pose quite a bit of problems in the long run, it is not a deus ex machina; the contradictions will not suddenly strike capitalism down just like the Greek Gods did to those who displayed too much hubris.

Regardless of whether or not the natural contradictions of capitalism will force it on its knees, or for that matter create a meaningful social resistance to the destruction, running up against the contradictions does result in some rather tragic ecological and social consequences in any event. Ultimately, both Marx and Engels were correct in pointing out the relationship between humans and the external world is dialectical in nature, and as such the way of life that we as a species ultimately adopt will have a profound impact on that relationship. There are already several other problems that the contradictions create in and of themselves, without having to invoke apocalyptic scenarios. Nuclear waste, global warming, deforestation, oil depletion, etc. are all by-products of the dialectic between capitalism and nature[198].

It is worth mentioning that for as long as capitalism existed, it always had an antagonistic relationship toward nature, much more so than any other society in the past. At the time when these problems were beginning to surface, the most pressing matter was that of agriculture. Back in the mid-nineteenth century a German chemist by the name of Justus von Liebig, who spent most of his time studying soil nutrients, used the concept of metabolism to describe how nutrients flow to and from the crop fields[199]. He was very critical of industrial agriculture, which was beginning to become adopted by the British, and stated that it was nothing more than an organized system of robbery, since the intensive methods used to increase yields sapped the soil

[198] Martin O'Connor, "Codependency and Indeterminacy: A Critique of the Theory of Production," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology,* ed. Martin O'Connor (New York: The Guilford Press, 1994), 69.
[199] Brett Clark and Richard York, "Rifts and Shifts: Getting to the Root of Environmental Crisis," *Monthly Review* 60, no. 6 (November 2008): 15.

of life-giving nutrients[200]. But while Liebig gave the physical basis for the crisis in soil fertility, it was Marx who fully explored the social dimensions[201]. To that end Marx borrowed the concept of metabolism and used it to describe the social relations to nature, and thus formulated the concept known as the metabolic rift[202].

A metabolic rift is exactly what it sounds like; it is quite literally a "rupture" between humans and the earth, in which the peculiar social structure or mode of production severs the connection between people and nature, and in the case of agriculture, breaks the cycling of nutrients between them[203]. But where do the nutrients end up going if not back into the soil? Well, instead of returning to the ground and renewing the vitality of the soil, the nutrients become a form of pollution, manifest as sewage and polluting the waterways[204]. The nutrients usually cannot be returned because it is already at a state of greater entropy (which, of course, is yet another nod to the first contradiction of capitalism). It is also important to note that capitalism did not necessarily invent the metabolic rift, as such phenomenon did certainly occur in other societies and civilizations, but it did greatly enhance the degree of material exploitation, evident from the sixteenth century onward[205].

The metabolic rift is perhaps one of the only things that capitalism does pay close attention too, because unlike the mass extinction of species or global warming, the metabolic rift does produce a crisis in production almost immediately. But how does capitalism decide to resolve by any of the crises that come its way? It certainly doesn't do it by cutting down on

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[200] Ibid.
[201] John Bellamy Foster, *Ecology Against Capitalism* (New York: Monthly Review Press, 2002), 155.
[202] Brett Clark and Richard York, "Rifts and Shifts: Getting to the Root of Environmental Crisis," Monthly Review 60, no. 6 (November 2008): 16.
[203] Ibid.
[204] John Bellamy Foster, *Ecology Against Capitalism* (New York: Monthly Review Press, 2002), 163.
[205] James W. Moore, "Ecological Crises and the Agrarian Question in World-Historical Perspective," *Monthly Review* 60, no. 6 (November 2008): 57.

production, since ever increasing production and consumption is the very essence of capital. Rather, it shifts the type of rift that is generated, and it only manages this after it reaches crisis proportions[206]. The modern history of agriculture provides perhaps the most blatant example of this.

When the British first brought agriculture along with them on the industrial path, the crisis in soil fertility came almost immediately. To give things some perspective, it is important to note that agriculture has been practiced on the British Isles for thousands of years without any real problems, up until the Industrial Revolution. It was the combination of intensive methods of agriculture to increase yields, combined with the transport of food commodities over long distances, that was the heart of the problem[207]. The answer to this crisis was not to stop the unsustainable agricultural practices, but to just simply import and manufacture fertilizer[208]. Thus they decided to first comb the Napoleonic battlefields for scattered human remains and import large quantities of guano from Peru[209]. This provided the basis of the first metabolic rift in Britain, which effectively severed the people from the land.

Of course, the importation of guano and bones didn't really resolve the crisis, all it really did was put industrial agriculture on life support. Sooner or later, guano and bones would be depleted, and the British, along with everybody else who decided to adopt their methods for agriculture, were beginning to look for other methods of increasing yields for the global market. It is around the early 20th century that full blown artificial and synthetic fertilizers came into full play, beginning with the Haber-Bosch process, which is a method of fixing nitrogen from the

[206] Brett Clark and Richard York, "Rifts and Shifts: Getting to the Root of Environmental Crisis," Monthly Review 60, no. 6 (November 2008): 17.
[207] Ibid. 16.
[208] John Bellamy Foster, Ecology Against Capitalism (New York: Monthly Review Press, 2002), 156.
[209] Ibid.

atmosphere via hydrogen, which comes from natural gas[210]. The shift from the use of natural sources of fertilizer, such as manure, to fossil fuels completes the first metabolic rift, and effectively seals off humanity from nature as the nutrients now have to be manufactured rather than recycled.

The second metabolic rift can be said to be caused by the Green Revolution, in which all agricultural practices became mechanized, and the practice of mono-cropping began to be used. Intensive methods of agriculture were revolutionized, and increased the yields of staple crops dramatically. And not just any crops, but what are called high-yielding varieties, which then set the stage for genetic uniformity in agriculture[211]. The large scale use of pesticides, and the appropriation of large amounts of land, water, and fertilizer were applied so that the exploitation of the soils could take place on a scale like never before. This rift served to sever humans from the land itself, since all food production became completely centralized. Around this time, the introduction of factory farming came in, and this would sever the animals from nature as well, because from this point onward the farm animals become completely dependent on manufactured food grown from manufactured nutrients, to say nothing of the cruel conditions that they are often kept under[212].

And nowadays we are in the midst of the third metabolic rift, which is currently being caused by the introduction of GMO crops. This rift not only threatens to cut humans and other animals off even more completely from nature, but also to cut off the plants themselves from the natural environment, and the natural conditions from which they can flourish. The use of genetic

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[210] Zmaczynski, Raymond. "THE EFFECT OF THE HABER PROCESS ON FERTILIZERS." *READING A MACHINE*. Princeton University, 2010. http://www.princeton.edu/~hos/mike/texts/readmach/zmaczynski.htm. (accessed 13 Nov. 2010).

[211] Jean-Paul Deleage, "Eco-Marxist Critique of Political Economy," in *Is Capitalism Sustainable?: Political Economy and the Politics of Ecology*, ed. Martin O'Connor (New York: The Guilford Press, 1994), 46.

[212] John Bellamy Foster, Ecology Against Capitalism (New York: Monthly Review Press, 2002), 163.

engineering is beginning to change agriculture itself from an activity based entirely on the natural conditions of the fields, to a manufacturing business[213]. The essence of the next metabolic rift will no doubt mean that the processes of life itself have to be manufactured in order so that it can continue, from the fertilizer inputs derived from fossil fuels to the engineering of genes that are more responsive to them. Thus humans are even more cut off from nature because everything comes not from natural processes, but from a factory.

And all at the same time, none of these "solutions" have ever been able to resolve the original crisis: the depletion of soils. This is what is meant by shifting the rift, in that all the solutions capitalism comes up with to resolve the "crisis of control" often does not solve any of the original problems; rather they are either neutralized so that they have no impact on the conditions of production, or the problems are moved around with the introduction of technology, or both[214].The degradation of arable land continues today, and it is continuing to accelerate. And at the same time, each of the revolutions in agriculture not only made the original problem worse, but it also created even more ecological problems. The massive use of synthetic fertilizer, aside from allowing us to fixate about as much nitrogen from the atmosphere as does nature, is giving way to large dead-zones in the oceans via fertilizer runoff[215]. The genetically modified monocultures that now dominate the Midwest are not only wiping out genetic diversity, but are also vulnerable to even the slightest change in climate conditions (which no doubt will be caused by global warming…) and disease. Factory farming is giving way to super-diseases thanks to the large inputs of antibiotics, all the while exacerbating the problems caused by industrial

[213] Vandana Shiva, *Staying Alive: Women, Ecology and Development* (London: Zed Books, 1989), 140.
[214] Brett Clark and Richard York, "Rifts and Shifts: Getting to the Root of Environmental Crisis," Monthly Review 60, no. 6 (November 2008): 14.
[215] John Bellamy Foster, Ecology Against Capitalism (New York: Monthly Review Press, 2002), 63.

agriculture since more than half of all food crops grown is used for animal feed[216]. And since the original crisis, that of the depletion of soil nutrients, was never resolved, more and more land has to be sought for and abandoned after a few years, thus leading directly to deforestation. Deforestation leads directly to the release of even more greenhouse gases, which then contribute to climate change, which then depletes arable land even faster due to evaporation and drought. Basically it forms a vicious cycle, in which one environmental crisis feeds off of another, all the while creating even more of them.

Agriculture is not the only place where the metabolic rifts are created; it also occurs everywhere else where large inputs of natural resources are utilized, as well as the social relations that occur in industrial production processes. The rise of computers and electronic communication, for example, usually cuts off face to face interaction. But the other primary place where it occurs is in the production of energy resources, in particular the transportation and electricity industries. For most of human history all societies have been reliant on solar power as their primary source of energy. Wind power, rain, hydro-power, food, etc. all derive their energy from the sun, or from the gravitational forces that act upon them (as is the case of tides or hydro-power). But with the introduction of fossil fuels, with millions of years worth of stored solar energy, most humans on the planet are now exclusively dependent on them. Fossil fuels, together with nuclear fission, serve to cut off humans from the life-giving sun itself. Natural sunlight gives way to electric light bulbs powered primarily from coal power plants, while solar heat gives way to gas and kerosene turbines as the sole source of heat. Current research into nuclear fusion is a continuation of this process, where we would rely not on the mighty proton-proton

[216] "Meat Production Wastes Natural Resources." *People for the Ethical Treatment of Animals (PETA): The Animal Rights Organization.* 2010. http://www.peta.org/issues/animals-used-for-food/meat-wastes-natural-resources.aspx. (accessed 15 Dec. 2010).

fuel cycle, which occurs naturally in the sun due to gravity and provides the basis for all life in the universe. Instead, we would rely on a synthetic fuel cycle involving deuterium and tritium, the latter which has to be bred from the Lithium-6 isotope[217]. The energy that would normally be provided by the sun itself would instead be confined in a facility and manufactured, just like the nutrients and the plants that provide the basis for agriculture.

It should now be clear that the contradictions of capitalism, together with the metabolic rifts that it creates, are the primary mechanisms from which the ecological crisis stem from. And yet, there are still more ways in which capitalism uses and abuses nature. For instance, capitalism tends to view all natural resources as a free gift, without any regard for whether anybody or any other living creature would need them for future uses[218]. As well, once they are brought into the logic of capital and become commoditized, there is an overall structure to the environmental damages caused. It should be mentioned that, as far as ecological damages go, they tend not to be uniform, for ecological damage tends to be worse where the regions are economically worse[219]. It is the same with the flow of large amount of natural resources; the vast majority of them are consumed by the elite and the ruling classes. Thus it can be said that both resource depletion and environmental damage are indeed reflected in the class structure of capitalism itself.

The reason nature is seen as a free gift to capital probably has something to do with the nature of commodity fetishism; namely, that it is because it does not have an exchange value[220]. Certainly, the machines that dig the holes and the labor of the miners have one, but the natural

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[217] "Nuclear Fusion." *Hyperphysics*. 2010. Web. 13 Nov. 2010. http://hyperphysics.phy-astr.gsu.edu/hbase/nucene/fusion.html.

[218] John Bellamy Foster, "Capitalism and Ecology:The Nature of the Contradiction," Monthly Review, http://www.monthlyreview.org/0902foster.htm (accessed November 10, 2010).

[219] Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed*, Later printing ed. (New York: Penguin, 2005), 324-330.

[220] John Bellamy Foster and Brett Clark, "The Paradox of Wealth: Capitalism and Ecological Destruction," Monthly Review, http://monthlyreview.org/091101foster-clark.php (accessed November 13, 2010).

resources that are being extracted do not. Since capitalism does not place any value on the "labor" of non-human creatures that supply wood or fuel, or the natural processes that form the geological deposits of important minerals and ores, it is therefore seen as something that is quite literally up for grabs[221]. This attitude, that everything in nature is up for grabs, contributes to the phenomenon known as the Tragedy of the Commons, as discussed earlier. And not only does it view the natural resources as a free gift, it also treats the wastes that it discharges as something that it can expel for free. The stratosphere, for example, acts as a free dumping ground for all of those nasty greenhouse gases and chlorofluorocarbons that are discharged by industrial processes, while the oceans act the same for fertilizer runoff.

But then there is the question of where all of those natural resources end up going, and in which locations the wastes end up being discharged. Well, it stands to reason that since natural resources are a fundamental prerequisite for the production of commodities, and thus the accumulation of wealth, it will follow the same path that the flow of wealth will go; that is, to the rich and the elite classes[222]. Like money, the natural resources under capitalism have the tendency to flow from the industrious, who make up the majority of the Earth's population, to the lazy, the so-called "elite" classes. This can easily be verified, as the richest countries on the planet tend to be the ones who consume most of the resources. The United States, the richest country on the planet, consumes more than 30% of all natural resources available[223].

Just as the concentration of natural resources tends to pool around the richest, the wastes of industrial civilization typically pool around the poorest. And for that matter, so do the worst of

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[221] Ibid.
[222] Donella H. Meadows, Jorgen Randers and Dennis L. Meadows, *Limits to Growth: The 30-Year Update*, 3 ed. (White River Junction: Chelsea Green, 2004), 44.
[223] *The Story of Stuff*. Dir. Louis Fox. Prod. Erica Priggen. Perf. Annie Leonard. *The Story of Stuff Project*. Free Range Studios, 4 Dec. 2007. http://www.storyofstuff.com/ (accessed November 2, 2010).

the environmental woes. Haiti, the poorest country in the Western Hemisphere[224], and Africa, the poorest continent on the planet, are but the most egregious examples. In particular, Haiti has some of the more severe ecological problems on the Western Hemisphere, as it has lost more than 99% of all forest cover, followed by the fact that it is extremely overpopulated[225]. The remaining 1% of the forest cover is constantly subjected to illegal logging, mostly by desperate peasants trying to find any possible way to make a living[226]. Haiti's rapid population growth does nothing to help the situation, and it also happens to have the highest rate of AIDS, malaria, and tuberculosis in the New World, all at the same time as the tiny rich minority enjoys the best that capitalism has to offer at the capital city of Port-au-Prince[227]. It is a country with small islands of wealth, amidst vast oceans of poverty and misery.

Africa, in particular the Sub-Saharan areas of the continent, is also in pretty desperate shape, both ecologically and socially. In Nigeria, for example, the oil companies utilize extensive flaring in their facilities, much to the dismay of the various indigenous populations that inhabit the area[228]. This indiscriminate flaring can be seen as a form of environmental racism or a global apartheid with regards to natural resource exploitation, as it is a blatant violation of indigenous rights[229]. Flaring contributes directly to greenhouse gas emissions, and thus further environmental degradation of Nigeria[230]. In other places, deserts are spreading as drought becomes ever more severe in many regions, combined with unsustainable agricultural

[224] Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed*, Later printing ed. (New York: Penguin, 2005), 330.
[225] Ibid.
[226] Ibid.
[227] Ibid.
[228] Anna Zalik, "Liquified Natural Gas and Fossil Capitalism," *Monthly Review* 60, no. 6 (November 2008): 45.
[229] Ibid.
[230] Ibid.

practices[231]. Furthermore, Africa has become the chosen region to house the growing amounts of electronic waste that is generated by the richer countries; much of this waste ends up in Nigeria, where it is routed through the port city of Lagos[232], where it pollutes much of the landscape and ends up in the backyards of local villages.

Part of the reason why the wastes tend to pile up in the poorest regions has largely to do with the attitudes that the rich have towards deciding who should have access to a clean environment. Back in 1992, Lawrence Summers, then the chief executive of the World Bank, made the argument that the third world countries are vastly "under-polluted" and should become the dumping ground for all of the wastes generated by the richer countries[233]. Thus, a clean environment should be seen as a luxury item enjoyed exclusively by the rich and well to do[234]. This argument, as John Bellamy Foster noted, was nothing more than a thinly veiled argument for the globalization of the practice that was already evident in the United States, such as the discharge of industrial pollutants in the waterways of the poorer neighborhoods[235]. It beggars the imagination on how they can even say this stuff with a straight face, but yet this makes perfect sense through the eyes and logic of capitalism. And even today it is still going on in the US, most particularly in the Appalachian Mountains, where mountain top removal is displacing

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[231] John T. Acha, "Sustainable Agriculture for the Conservation of Biodiversity in Cameroon." *Enviro-Protect: Association Internationale Pour La Protection De L'Environnement En Afrique*. 11 Nov. 2009. Web. 13 Nov. 2010. http://www.enviroprotect.org/en//dossiers/dossiers.php?val=6_sustainable agriculture for the conservation of biodiversity in cameroon.

[232] Charles W. Schmidt, "Unfair Trade E-Waste in Africa." Environmental Health Perspectives. National Center for Biotechnology Information, Apr. 2006. Web. 15 Dec. 2010. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1440802/.

[233] John Bellamy Foster, Ecology Against Capitalism (New York: Monthly Review Press, 2002), 61.

[234] Ibid.

[235] Ibid. 63.

communities that have been there for generations, and the wastes generated are making their way into the water supply, where they poison the various communities that are dependent on them[236].

And now, given all this vast destruction taking place and extreme overexploitation, what does capitalism have to say for itself? Well, according to Heather Rogers, author of Green Gone Wrong, the solution to be adopted by mostly economists and business leaders is the notion of green capitalism or natural capitalism[237]. Popularized by Amory Lovins and L. Hunter Lovins, the idea behind "natural capitalism" is to create businesses that not only prioritize profits, but to be socially and ecologically responsible doing so[238]. According to the Lovins', the real reason that capitalism has failed to be ecological is because of a malfunctioning market, which is caused by governments paying subsidies toward dirtier businesses (it never occurs to them that, on the contrary, they were probably bought out); as such, the market is not "free" enough[239]. Thus, the solution is to assign a negative value to consumer products to account for the damages, rather than addressing the root social and economic processes from which they stem[240]. And this alone will cause the market to work properly, and consumers will demand more eco-friendly products, thus causing the competition to shift toward environmental stewardship[241].

The problem with this "solution" is that capitalism reproduces itself on ever larger scales and strives for infinite growth. As such policies cannot even hope to slow down the degradation of the biosphere, let alone stop it. All available evidence points to the fact that the ecological

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[236] John G. Mitchell, "When Mountains Move," *National Geographic*, March 2006. http://science.nationalgeographic.com/science/earth/surface-of-the-earth/when-mountains-move.html (accessed December 15, 2010).
[237] Heather Rogers, *Green Gone Wrong: How Our Economy Is Undermining the Environmental Revolution* (New York: Scribner, 2010), 188.
[238] Ibid.
[239] Ibid. 189.
[240] Ibid. 190.
[241] Ibid.

damages are occurring at an accelerating rate, despite the feeble environmental laws and policies put into place that aim to protect it. As the main priority of businesses is to ensure that they make a profit, taking action towards environmental sustainability is occurring at a pace even slower than the plot of a typical shonen anime.

Overall, it has become clear that capitalism is intrinsically destructive to the environment, no matter how one wishes to dissect it. Contradictions abound everywhere, whether with regards to the social or environmental conditions of production. The noble ideals of environmental stewardship, conservation, and humility are opposed to the most basic principles and values of capitalism, and fundamentally so. Capitalism is no more reformable a system than, for example, slavery or racism. The very idea of "sustainable exploitation" of the environment is an oxymoron; it just simply cannot be done. The only way that one can hope to save the environment, and conserve the remaining natural resources available, is to abandon capitalism as a system of "welfare" completely.

Jevon's Paradox

For the past few decades, conservation and increased efficiency have been seen as the key to limiting natural resource extraction and preserving what remains of our natural environment, whether it is forests or mountains. In recent years it has become quite fashionable for businesses and corporations to use recycling and conservation programs in order to "green" their image. By greening their image, it is hoped that they can turn environmental responsibility from a costly burden to a source of ever larger profits. Catch phrases such as "sustainable seafood", "X% post-consumer waste", or "increased fuel efficiency" give the commodities an aura of environmental benignity, and the message that everything is all right. But can mere conservation and recycling really slow down and halt depletion of natural resource (and their fantastically destructive methods of extraction)? It is almost baffling to believe, but under capitalism, conservation does not indeed halt, or even slow down the depletion of natural resources, nor does it stop the ever larger volumes of waste from being produced. Upon closer inspection, the idea of "green capitalism" is nothing more than a mirage among the vast deserts of its ever growing landfills. In a completely paradoxical twist, conservation and increased efficiency actually make things worse under capitalism instead of better; that is, they lead to even greater consumption of natural resources instead of less. How can this possibly be, especially since the idea of conservation is to use less? It turns out that, in our capitalist society, there is an economic and/or social mechanism that works to completely doom any and all attempts at conservation, creating a phenomenon known as Jevons Paradox.

Now then, what is Jevons Paradox, and how does it manage to nullify any gains in energy/resource efficiency or conservation? Jevons Paradox, named after a nineteenth century economist by the name of William Stanley Jevons, is an argument that states that increased

efficiency in a natural resource will lead to increased, rather than decreased, consumption[242]. This alarming idea was first discussed in his 1865 book The Coal Question, and it is in here that he argued that increased efficiency leads to increased use, rather than the other way around[243]. How can this possibly be so? Under capitalism, there are three effects that come into play with regards to natural resource use, the direct rebound effect, the indirect rebound effect, and the indirect economy effect.

The direct rebound effect, which is most common, is when increased efficiency causes people and corporations to buy more of the device or commodity, such as steam engines or gas turbines[244]. Why does this happen? Well, increased efficiency leads to a decrease in the price of the commodity in question, and a decrease in the price of refueling or recharging it, and thus encourages greater consumption. The indirect rebound effect occurs when the fuel that is saved is then used somewhere else[245]. A modern scenario would be the energy that is saved by the use of compact florescent light bulbs (CFL) is then reinvested in either more CFL's, or in more electronic devices, etc. And finally, the indirect economy effect occurs when the money saved from decreased energy use is then reinvested in other goods and services that require substantial amounts of energy and resources[246]. So, for example, say you saved a great deal of money on your energy bills, and then decide to invest that money in vacations (thus increasing fuel use) or in conspicuous consumption (increasing natural resource use). These three mechanisms, combined with both economic and population growth, act to nullify and overwhelm any gains in efficiency or conservation, and thus increase natural resource use. So, much to the disbelief of

[242] John Bellamy Foster, *Ecology Against Capitalism* (New York: Monthly Review Press, 2002), 94.
[243] Peter Tertzakian and Keith Hollihan, *The End of Energy Obesity: Breaking Today's Energy Addiction for a Prosperous and Secure Tomorrow* (Hoboken: Wiley, 2009), 118.
[244] Ibid. 119.
[245] Ibid.
[246] Ibid. 120

most mainstream environmentalists (many of whom support the idea of green capitalism), what actually happens when energy or resource efficiency increases is that people usually buy more stuff and services, simply because they now have the money to do so, and in the process cancel out whatever gain they might have made to reduce resource consumption.

There is no shortage of examples of the manifestation of Jevons Paradox in all societies which have adopted a policy of unrestrained economic growth. From the increased number of coal powered steam engines back in nineteenth century, to the increased use of city lighting in modern times, most every technological advance in the realm of efficiency had ensured that resource consumption would grow. The best example by far in contemporary times is the use of the car, where increased fuel efficiency just simply meant greater fuel consumption. This is particularly true in the car dominated cities of North America and Australia, where although there have been significant improvements in fuel economy, fuel consumption still increases because there are now more cars on the road[247]. Just how bad is it, though?

In the United States, where the automobile reigns supreme, the fuel efficiency of the average passenger car increased from 16.0 mpg to about 22.5 mpg between the years 1980 and 2004[248]. And by 2016, fuel efficiency is projected to raise to an average of 35.5 mpg[249]. But at the same time, the number of cars on the roads increased by more than 50% in those 24 years,

[247] Erik Assadourian, *State of the World 2010: Transforming Cultures: From Consumerism to Sustainability (State of the World)*, Original ed. (New York: W. W. Norton & Company, 2010), 135.
[248] "BTS | Table 4-23: Average Fuel Efficiency of U.S. Passenger Cars and Light Trucks."*Bureau of Transportation Statistics (BTS)*. 2009. http://www.bts.gov/publications/national_transportation_statistics/html/table_04_23.html. (accessed November 17, 2010).
[249] Heather Rogers, *Green Gone Wrong: How Our Economy Is Undermining the Environmental Revolution* (New York: Scribner, 2010), 120. This occurred only after Obama took office, however. Fuel efficiency for the most part had remained stagnant.

from 156 million to about 237 million[250]. Because of this huge increase, fuel consumption surged inexorably upwards, from 2.4 billion barrels of gasoline in 1980 to about 3.3 billion barrels in 2004, representing an increase of about 37.5%[251]. So right here we have perhaps the clearest manifestation of Jevons Paradox. As one can see, despite the fact that cars produced in 2004 were about 40% more efficient than the cars produced in 1980, fuel consumption still increased by a lot. In short, the gains made by ingenious technical advances were easily overcome by the increase in automobile demand.

The car, of course, is hardly the only example. Because the modus operandi of capitalism is to grow perpetually and accumulate endless amounts of capital, all efforts of energy conservation are doomed to fail. One can not only see this in the automobile, but also in electricity production. As well, this trend also sticks out like a sore thumb when one looks at electricity consumption trends, especially in the United States. Between 1989 to 2009, the amount of electricity that came from wind power, a renewable resource that also does not pollute, increased from 2100 GWh to 70,800 GWh, but at the same time the electricity produced from coal also increased dramatically, from 1,554,000 to 1,718,800 GWh[252]. Electricity from natural gas, another fossil fuel, also exhibited dramatic growth rates, from 266,900 to 721,800 GWh over 20 years[253]. Between 1989 and 2009, the total amount of fossil fuel consumption for electric production increased by 25%, despite the fact that the amount of electricity from all renewable sources of electricity (wind, solar, hydroelectric, geothermal, biomass, etc.) increased

[250] "Licensed Drivers and Vehicle Registrations." *Infoplease*. Pearson Education, 2004. http://www.infoplease.com/ipa/A0908125.html. (accessed November 17, 2010).
[251] "U.S. Product Supplied of Finished Motor Gasoline(Thousand Barrels)." *U.S. Energy Information Administration - EIA - Independent Statistics and Analysis*. 2010. http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MGFUPUS1&f=M (accessed November 17, 2010). For this one, you are going to have to do the math yourself, because the data is in terms of barrels per month.
[252] "Electricity Net Generation 1989-2009: Electric Power Sector by Plant Type," US Energy Information Administration, http://www.eia.doe.gov/emeu/aer/pdf/pages/sec8_10.pdf (accessed November 15, 2010).
[253] Ibid.

by more than 27% in the same time period; wind power, in particular, increased by more than 3200%[254]. But despite the growth of the renewable industries, fossil fuels still provide over 67% of all electricity generated in 2009, compared to more than 70% over 20 years ago[255]. Thus, despite the combined might of energy star appliances, vastly improved efficiency in electric consumption in general, and even the recent economic meltdown, the demand for electricity remains still greater and shows no sign of going down.

So, as one can see, even if anybody does try to conserve resources under capitalism, it just does not work. Jevons Paradox will defeat any and all attempts to save energy and resources, because they will just simply be gobbled up by increasing demand. Thus, unless the imperative for economic growth is removed completely, there is no hope at all for the remaining natural resources.

[254] Ibid.
[255] Ibid.

The Corporation

Of the many superstructures that support capitalism, perhaps the most ubiquitous of them all is the corporation. The corporation permeates all aspects of life, and they now play a fundamental role in the livelihood of the average global citizen. All of the modern comforts now taken for granted are all produced by corporations, from cars to modern medicine to the telecommunication infrastructures now in place, such as the internet. Even most of the food now bought in stores was produced by a company, rather than a family farm. The few resources left that are not produced directly by them, such as water and air, are nonetheless being inexorably brought under their control as time goes on. Corporations can be appropriately described as proverbial black holes, from which all natural resources, human beings and animals gravitate towards, mostly against their will, to the point of no return.

What is a corporation, and why are they fundamental to capitalism? There are many ways that a corporation can be described, such as a group of elites who control the natural and human wealth of a society, not unlike the feudal lords of the Middle Ages. They can also be seen as private governments, as Marjorie Kelly has argued, since the corporation is ultimately portrayed as a private institution, but with a vast amount of power over the working class[256]. However, the case will be laid that it is perhaps best to view it as a machine, one designed to make money at any cost. A machine, using Lewis Mumford's definition, is a combination of resistant and specialized parts that use and transform energy to do useful work, all under the fingertips of a human operator[257]. It is important to note, as Mumford proclaims, that it does not matter what a machine is made of, it could either be comprised of dead and inert matter, such as iron or plastic, or it could be made of flesh and bone, such as animals or humans; the only criteria that matters is

[256] Marjorie Kelly. *The Divine Right of Capital*. (San Francisco: Berrett-Koehler Publishers, Inc., 2003): 131-132
[257] Lewis Mumford. *The Myth of the Machine*. (New York: Harcourt, Brace & World, Inc., 1967): 191

the fact that, in his words, they "were reduced to their bare mechanical elements and rigidly standardized for the performance of their limited tasks"[258]. The corporation fits this definition quite nicely, since all labor, whether human or machine, is over-specialized for a single task in order to maximize production of commodities. Whether the task is flipping burgers all day long, as is the case in fast food restaurants, or more sophisticated tasks like the programming of video games and operating systems, all labor is rigidly standardized and act as a proverbial cog in the wheel, where their sole purpose is to produce as much commodities as possible. The humans that work with the corporations, even the bosses, can thus be seen as machine components, where their behavior is modified for the purpose of serving the corporation[259]. Furthermore, a corporation utilizes energy, mostly in the form of fossil fuels, in order to transform or modify the external world in ways that would be most useful for the accumulation of wealth. Therefore, a corporation is a machine, and one that must burn fossil fuels, transmute large volumes of uranium, and modify billions of tons of both organic and dead matter, in order to survive. And they are fundamental to capitalism, because the corporation is the primary apparatus by which Karl Marx's M-C-M' circuit can move forward[260].

Like any other machine, the corporation will only follow the programming inherent in its design. That corporations only exist to make money is universally agreed upon by both Marxists and Capitalists alike; Milton Friedman even put the case that the only moral responsibility that a

[258] Ibid. More generally, it can be thought of as a megamachine, since in reality a corporation is more of a superstructure. Lewis Mumford points out that governments and other institutions can also be seen as megamachines, since they all utilize energy to do useful work for the ruling classes. He argues that the mechanization of humans predates the mechanization of instruments, evident from the time of Ancient Egypt onwards. The corporation, thus, is just the modernized version of an ancient invention.

[259] For that matter, corporations also modify the behavior of animals, in particular factory farms, where they are forbidden to engage in their natural behaviors.

[260] Marx, Karl. "Capital, Volume One." *The Marx-Engels Reader*. 2nd Ed. Ed. Robert C. Tucker. New York: W.W. Norton & Company, Inc., 1978. 332.

corporation has, is to make a profit and act only in the interests of its shareholders[261]. But in a way, it differs from a regular machine, or for that matter even a typical megamachine, in a couple of aspects. For example, the phrase "garbage in, garbage out"[262], a phrase normally used in computer terminology (but can be equally applicable across all instruments), does not apply. This is because of the peculiar nature of the commodities produced by corporations. The vast majority of all commodities produced, with perhaps the exception of intellectual property, are made under the doctrine of Planned Obsolescence, whereby they are deliberately made to be of inferior quality[263]. Planned Obsolescence has its roots back in the early 1930's, when an engineer working for General Electric proposed that light bulbs should be made only to last the duration of a single battery, and then made routine later in the mid-twentieth century [264]. In particular, during the fifties it was argued that engineers should not be at all concerned with the prospect of deliberately making products that are designed to fall apart within a short time, because it was necessary to make them in the interests of the market[265]! As a result of this, more than 99% of all commodities in production today are thrown out six months later[266]. Modern day examples of planned obsolescence is most apparent in the consumer electronics market, where it is not uncommon for computers, video game consoles, or iPods to break shortly after their warranty expires[267].

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[261] Marjorie Kelly. *The Divine Right of Capital*. (San Francisco: Berrett-Koehler Publishers, Inc., 2003): 62.
[262] "Garbage-in, Garbage-out (GIGO) Definition." *BusinessDictionary.com - Online Business Dictionary*. WebFinance, Inc., 2010. Web. 10 Dec. 2010. <http://www.businessdictionary.com/definition/garbage-in-garbage-out-GIGO.html>.
[263] Beder, Sharon. "Is Planned Obsolescence Socially Responsible?" *Engineers Australia* (1998): 52.
[264] Ibid.
[265] Ibid.
[266] *Story of Stuff*. Dir. Louis Fox. Prod. Erica Priggen. Perf. Annie Leonard. *Story of Stuff*. Free Range Studios, 4 Dec. 2007. Web. 10 Dec. 2010. <www.storyofstuff.com>.
[267]Another big example is the space program; compare the Soyuz rockets to those made by NASA. To this day, the Russians still use the same systems built shortly after the time of Sputnik and are still more reliable than their American counterparts, while NASA is currently retiring the space shuttle just so they can get another upgrade. On

Thus, most commodities produced today are a form of garbage, everything from computers to automobiles. Regardless of the fact that some products last longer than others, the fact of the matter is that they are all destined to the landfill, or to be outsourced to some unimportant third world nation, where they would be out of sight of the middle and upper classes[268]. One must understand that it is their business to convert the world and its inhabitants into garbage before hitting the biophysical brick wall (either resource depletion or over-pollution) and going bankrupt. Unlike the standard "garbage-in, garbage-out" terminology normally reserved for computers, the corporation is a case of "living/organic/quality things in, garbage out", every single time.

The other peculiar aspect of the corporation, as has been noted in the paragraphs before, is the question of their moral obligation, or rather the lack thereof. Unlike all of the past civilizations and hunter-gatherer tribes, the corporations are different in that they have dropped all pretense of having any moral or social responsibility whatsoever, instead pursuing their own self-interest at any cost. Before the rise of capitalism and the corporation, most civilizations hitherto pretended to have been around for the benefit of its people, or at the very least the people they considered to be citizens. This was the case even in the West, before the Industrial Revolution. For instance, Aristotle argued that the ruling classes must be educated away from what he called pleonexia, literally meaning "the insatiable desire to have more"[269]. And after Aristotle, the philosophers Rousseau[270] and Marx, just to name a couple of modern ones, all

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a more amusing note, the practices of the computer industry forced NASA to have to shop on Ebay for parts no longer manufactured: http://www.nytimes.com/2002/05/12/us/for-parts-nasa-boldly-goes-on-ebay.html

[268] In particular, read this article: http://news.bbc.co.uk/2/hi/africa/6193625.stm, where it is stated that Nigeria "imports" up to 500 tons of E-waste daily. It is yet another example of environmental imperialism, where a clean environment is reserved for the wealthy, and the wastes ejected to the backyards of the poor.

[269] Joel Jay Kassiola, *The Death of Industrial Civilization: The Limits to Economic Growth and the Repoliticalization of Advanced Industrial Society* (Albany: State University of New York Press, 1990), 133.

[270] Ibid. 130-133.

argued for the social responsibility of the powerful to the weak, along with arguing for the elimination of such divisions.

The modern corporation has no such obligation to either the people that it employs (and for that matter, the people it does not employ), or the animals and the planet that it subjugates and exploits. As far as they are concerned, the only thing that matters is their own survival. And not the survival of the employees that it exploits, but the survival of the organization itself. Indeed, it does not even matter if the original owner is still living, or who its stockholders are, the only thing that matters is that the hierarchical structure remains intact, and that it continues to profit off of the patents and inventions of the original owner. A couple of modern examples include Disney and General Electric, as these companies have long outlived both Walt Disney (died in 1966[271]) and Thomas Edison (died in 1931[272]), but nonetheless continue to profit off of their original patents and compete with other businesses.

The bar for moral responsibility on behalf of the corporations have at this point become so low that they need not concern themselves with whether or not its employees have enough to live. Consider, for example, the case against minimum wage laws by Milton Friedman, for he puts it quite bluntly that they should not be put in place because it is most certainly not in the interest of the employers to do so[273]. Karl Marx long ago pointed out that the only real limitations to the exploitation of labor, and thus the extent at which employers may be allowed to exploit the employees, are the physical considerations (i.e. needing to eat and sleep), and

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[271] Brad Aldridge. "Walt Disney Timeline: Page 2." *Walt Disney - Just Disney.com Disney*. Brad Aldridge Productions, Aug. 2002. Web. 11 Dec. 2010. http://www.justdisney.com/walt_disney/timeline/nextpage.html.
[272] "Edison's Miracle of Light: Timeline." *WBGH American Experience*. Public Broadcasting Service, 2000. Web. 11 Dec. 2010. http://www.pbs.org/wgbh/amex/edison/timeline/index_2.html.
[273] Milton Friedman, *Capitalism and Freedom: Fortieth Anniversary Edition* (Chicago: University Of Chicago Press, 2002), 180.

whatever social constraints exist at the time (i.e. laws, culture, etc.)[274]. The same can be said with the environment, where the only real physical limitation is the amount of total available net energy generated by industrial civilization (which is now steadily decreasing as fossil fuels are being depleted). As far as ethical or social constraints go, they are completely nonexistent, as everything is now up for grabs. As well, their lack of concern for moral or social responsibility to either people or the environment has been made much easier in modern times, since it makes perfect sense under the capitalist "spirit" in the first place; Lewis Mumford points out that the effect of capitalism was to turn the five deadly sins of Christianity, pride, envy, greed, avarice, and lust, into social virtues, in stark contrast to earlier Western philosophers such as Aristotle[275]. These values, which are collectively known as consumerism, are now so fully ingrained that it is no longer recognizable as a cultural construction, but rather as a "natural" condition of the human species[276].

In this day and age, corporations are legendary for their disregard for moral virtues and their parasitic relationship to cities, nations, and even entire continents. There is also some evidence that they are attempting to expand beyond the bounds of a single planet and preparing to sap the vitality of the rest of the solar system, as the recent launch of The Dragon shows, which is a privately owned spaceship built by SpaceX Corporation[277]. But it is important to note that corporations were not always so uncontrollable in the past. Before around 1860, corporations were mostly under the direct control of the people and the governments of the lands

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[274] Karl Marx and Friedrich Engels, *The Marx-Engels Reader (Second Edition)*, ed. Robert C Tucker, 2nd Revised & enlarged ed. (New York: W. W. Norton & Company, 1978), 362.
[275] Lewis Mumford. *The Myth of the Machine*. (New York: Harcourt, Brace & World, Inc., 1967): 277.
[276] "The Rise and Fall of Consumer Cultures." *State of the World, 2010: Transforming Cultures : from Consumerism to Sustainability : a Worldwatch Institute Report on Progress toward a Sustainable Society*. Comp. Erik Assadourian. Ed. Linda Starke and Lisa Mastny. (New York, NY: W.W. Norton, 2010). 8.
[277] Steven Siceloff. "NASA - SpaceX Launches Success with Falcon 9/Dragon Flight." *NASA -- Home*. NASA, 9 Dec. 2010. Web. 12 Dec. 2010. <http://www.nasa.gov/offices/c3po/home/spacexfeature.html>. Indeed, privatizing the space program could perhaps be the stupidest thing the Obama Administration could have possibly done.

that they inhabited[278]. Ted Nace, in his book Gangs of America, designates the corporations that existed before 1860 as the Classic Corporation, while corporations from the beginning of the twentieth century onwards as the Modern Corporation[279]. There are several defining features that differentiate the Modern and the Classic Corporation.

For instance, before about 1860, corporations were severely restricted by the federal government and were extraordinarily difficult to create, for they needed a custom charter issued by the state[280]. The state had complete power over them, and with it the ability to revoke the charter, and thus shut it down, should they prove to be against the interests of the state or the communities that they happen to operate in[281]. If they could be said to have a moral conscience, it came from the fact that they had unlimited liability; if there was any breach of trust between them and the communities or the state, there was the threat of charter revocation hanging over them, or worse[282]. And along with limited mobility and the inability to own stock in other companies (they were limited to their home state, unlike today where we have transnational corporations), they also had a limited lifespan, for most corporations could only be chartered for about a couple of decades[283].

But that started to change in the aftermath of the Civil War. For instance, they started to have limited liability rather than unlimited liability[284]. But the real transformation began when, in 1886, a reporter attached a headnote to the case of the Santa Clara County vs. Southern Pacific

[278] Ted Nace, *Gangs of America: The Rise of Corporate Power and the Disabling of Democracy* (San Francisco: Berrett-Koehler Publishers, 2003), 87.
[279] Ibid.
[280] Ibid. 88.
[281] Ibid.
[282] Ibid. 88, 95.
[283] Ibid. 88.
[284] Ibid. 95. In the British Empire, for example, they adopted the doctrine of limited liability as early as 1855. As for the United States, this happened more gradually, usually on a state by state basis. By the beginning of the twentieth century, all liability on the part of the corporations was eliminated.

Railroad which stated that the Supreme Court had ruled that corporations should be considered "persons", and are protected by the Bill of Rights[285]. It was this event that marked the birth of the modern corporation as a "person", and it marked the first time in human history that a megamachine had the complete autonomy of that of an individual. This event would set the stage for the complete elimination of all the other restrictions, and the steady acquisition of constitutional rights throughout the twentieth century[286].

The elimination of the doctrine of limited liability, combined with the end of the charter system, led the corporations to what Ted Nace would call the "Shedding of their Conscious Mechanisms"[287]. It is true, of course, that their ethical programming was already rudimentary to begin with, especially since the application of criminal law was either impractical or nonsensical where corporations were concerned, since they were organizations and could not be jailed, flogged, executed, etc.[288]. But the reported Supreme Court ruling completely eliminated them once and for all, and led to the ridiculous state of affairs that exist today, where corporations do not even have the obligation to ensure that their customer service works properly[289], let alone take responsibility for the environment or the various communities that it exploits.

The fact that corporations acted purely in their own self-interest was one of the major reasons many of them were blatantly shut down during the early days of the United States, and

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[285] Thom Hartmann, *The Last Hours of Ancient Sunlight the Fate of the World and What We Can Do Before It's Too Late: Revised and Updated*, Rev Upd Su ed. (New York: Three Rivers Press, 2004), 219.
[286] Ted Nace, *Gangs of America: The Rise of Corporate Power and the Disabling of Democracy* (San Francisco: Berrett-Koehler Publishers, 2003), 88.
[287] Ibid. 94.
[288] Ibid. 95.
[289] Take, for example, the fact that America Online was notorious for continuing to bill its customers long after they have moved on to other internet service providers. They still charged people who have already died for internet service: http://hubpages.com/hub/Even_dead_people_cant_escape_AOL_Hell.

were forbidden to create monopolies[290]. But since the time the corporations were allowed to be considered persons and were to be fully protected under the law, it had all gone downhill from then on. At first, with the elimination of the charter and the doctrine of limited liability, they would become effectively immortal, since there are now no limits to how long corporations can last[291]. Then, in 1978, the Supreme Court ruled that the First Amendment applied equally to corporations, since they were considered persons, and thus were allowed to flood the airwaves and contribute almost unlimited amounts of money to favored politicians and political parties[292].

As a result, this has led directly to a phenomenon known as inverted totalitarianism, where Sheldon Wolin states that due to the fact that corporations practically own the political system, the United States has become a sort of "managed democracy", and the rights of the home nation are defined by powers that are without scope, particularly where economics are considered[293]. And very recently, back in January 2010, the Supreme Court blocked a law that limited the amount of money that corporations could contribute to political campaigns[294]. As time goes on, the corporations have grown steadily more powerful, both politically and culturally. And they continue to keep growing in power, made easier due to the fact that they have been granted immortality and the fact that they are protected as persons under law. Over the course of the twentieth century, there were many fears that humanity's own creations, most notably the machines, would gain sentience and rise against them to take over the world, as the

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[290] Thom Hartmann, *The Last Hours of Ancient Sunlight the Fate of the World and What We Can Do Before It's Too Late: Revised and Updated*, Rev Upd Su ed. (New York: Three Rivers Press, 2004), 218.
[291] Ted Nace, *Gangs of America: The Rise of Corporate Power and the Disabling of Democracy* (San Francisco: Berrett-Koehler Publishers, 2003), 90.
[292] Thom Hartmann, *The Last Hours of Ancient Sunlight the Fate of the World and What We Can Do Before It's Too Late: Revised and Updated*, Rev Upd Su ed. (New York: Three Rivers Press, 2004), 220.
[293] Sheldon S. Wolin, *Democracy Incorporated: Managed Democracy and the Specter of Inverted Totalitarianism* (Princeton: Princeton University Press, 2008), 131-58.
[294] Adam Liptak, Justice, 5-4, Reject Corporate Spending Limit, *New York Times*, Janurary 21, 2010. http://www.nytimes.com/2010/01/22/us/politics/22scotus.html (accessed December 9, 2010).

Terminator movies or the Matrix can attest to. But such a thing already happened before the twentieth century began, as that was the time that the machines, the corporations, gained "sentience" and have since thoroughly subjugated the entire planet. They are now literally beyond human control, since no individual person, town, city, state, or government can possibly contain their influence.

This, of course, does not bode well for the planetary biosphere, since the corporations effectively act without limits. Even before the corporations were explicitly allowed to influence politicians any way they wanted, there was already evidence of their heavy influence in the workings of the government and in the mass media in the mid twentieth century. The earliest instances of this revolved around the oil industries, where companies like the Anglo-Persian Oil Co. (APOC) were allowed to direct British foreign policy to make way for the exploitation of the oil fields in the Middle East before the beginning of World War I[295] . Rachel Carson also described this phenomenon regarding the indiscriminate use of insecticides, where the Department of Agriculture aggressively argued for their application in regards to the fire ant:

> "With the development of chemicals of broad lethal powers, there came a sudden change in the official attitude toward the fire ant. In 1957 the United States Department of Agriculture launched one of the most remarkable publicity campaigns in its history. The fire ant suddenly became the target of a barrage of government releases, motion pictures, and government—inspired stories portraying it as a despoiler of southern agriculture and a killer of birds, livestock, and man."[296]

[295] Stephen C. Pelletière, *America's Oil Wars* (Westport, CT: Praeger, 2004), 35.
[296] Rachel Carson. *Silent Spring*. Anv ed. (Boston: Mariner, 2002). 162.

As it so happened, after Carson published her book Silent Spring in 1962, the chemical industry launched a massive campaign against her and the book, where she was described as "a woman out of control", and spent over a quarter of a million dollars in an effort to discredit her[297].

It became a lot worse after the 1960's, when the corporations were able to magnify their influence across the entire world like never before. The World Bank, for instance, got into the business of funding various tree planting schemes in the late 1970's, as described by Vandana Shiva, for primarily interests[298]. Not only did it lead to grave environmental consequences in India, such as the elimination of genetic diversity, but as Shiva puts it:

> "Nature's locally available seeds were laid waste; people's locally available knowledge and energies were laid waste. With imported seeds and expertise came the import of loans and debt and the export of woods, soils—and people."[299]

The corporations, of course, did not just stop at the forests of India, they also spread into their food supply as well. Although this process occurred as early as 1941, when the Rockefeller Foundation opened a research center that concerned itself with breeding plants, it was not until after the Green Revolution was in full swing that the corporations completely took over[300]. It was from this point forward that food production was geared exclusively toward the market economy, and with it the introduction of hybrid seeds, chemical fertilizers, pesticides, and large scale mechanization and irrigation[301]. It was to be the precursor of the actual genetic manipulation of the seeds and animals themselves, for the sole benefit of biotech companies like Monsanto.

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[297] Linda Lear. "Introduction." Introduction. *Silent Spring*. By Rachel Carson. (Boston: Mariner, 2002). Xvii.
[298] Vandana Shiva, *Staying Alive: Women, Ecology and Development* (London: Zed Books, 1989), 77-79.
[299] Ibid. 79.
[300] Ibid. 98, 103.
[301] Ibid. 103-104.

Because corporations are beyond human control, the best that people can now hope for is the introduction of labeling for genetically modified foods, or for other things like the application of hormones in meat and dairy. But so successful the corporations have been in corrupting government officials that they are now putting policies in place that do not require companies have to worry about applying labels, for instance the recent ruling in September 2010 by the FDA that gives them the privilege to not mention whether the salmon being sold was genetically modified from birth[302]. Another case of this occurring was when Ben & Jerry's, an ice-cream company based in Vermont, actually sued the corrupted government over the fact that they were preventing them from putting a label that mentioned that the milk they used did not have any synthetic growth hormones or antibiotics in it, and ended up losing the case[303]. So, as one can see, not only are the corporations preventing mandatory labeling from taking place, but they are also preventing other businesses from practicing voluntary labeling. Of course, if that were allowed, they would be beaten at their own game and run right out of business. So, contrary to Friedman's argument that the government should play no part in the political economy[304], it turns out that it is an indispensible tool for allowing the corporations to flourish, since access to the Bill of Rights, and the deliberate inaction of the government, is the only way they can possibly be allowed to shed their moral conscience and accountability. Combined with the corruption of intellectual elites, especially the scientists and engineers who are critical for the

[302] Lyndsey Layton, FDA rules won't require labeling of genetically modified salmon, *Washington Post*, September 18, 2010. http://www.washingtonpost.com/wp-dyn/content/article/2010/09/18/AR2010091803520.html?wprss=rss_nation (accessed December 12, 2010). If you read the article, the people who represent the corporations argue that one of the reasons they don't want to tell is because it will "confuse the consumer" and prevent them from making "informed" choices, especially since they are not "educated" about biotechnology. It is a perfect example of a corporation laying waste to locally available or democratic knowledge; they are not allowed to choose precisely because they are not experts, and thus their knowledge is "worthless".

[303] Thom Hartmann, *The Last Hours of Ancient Sunlight the Fate of the World and What We Can Do Before It's Too Late: Revised and Updated*, Rev Upd Su ed. (New York: Three Rivers Press, 2004), 58.

[304] Milton Friedman, *Capitalism and Freedom: Fortieth Anniversary Edition* (Chicago: University Of Chicago Press, 2002), 22-36.

manufacture of commodities and thus their basic source of nourishment[305], the corporations now virtually control almost every aspect of life, from the telecommunication systems to most of the food supply.

The modern corporation is thus shown to be the primary machine by which capitalism flourishes, and makes possible economic growth and the accumulation of wealth in the hands of the rich. Some people, like Marjorie Kelly, have put forth the argument that the emergence of the corporation is but an aberration of capitalism, that under the true ideals of the free market, such things would not exist:

> "What we have known until now is capitalism's aristocratic form. But we can embrace a new democratic vision of capitalism, not as a system for capital, but a system of capital—a system in which all people are allowed to accumulate capital according to their productivity, and in which the natural capital of the environment and community is preserved."[306]

But can such a thing really be possible? Unfortunately, capitalism is full of contradictions, as Marx pointed out over a century ago. In particular, he noted that since competition is vital to the functioning of the so-called "free market", all capital must necessarily concentrate in fewer and fewer hands, thus giving rise to winners and losers[307]. Thus, there can never be a "democratic" capitalism, simply because it is not possible. Rather than the corporation

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[305] Sheldon S. Wolin, *Democracy Incorporated: Managed Democracy and the Specter of Inverted Totalitarianism* (Princeton: Princeton University Press, 2008), 159-183. In particular, the chapter entitled "Elites Against Democracy" details how the intellectual elites are corrupted by the political economy, where those who conform are treated like kings and are given large sums of grant money, while those who do not are just simply ignored or even harassed.

[306] Marjorie Kelly. *The Divine Right of Capital*. (San Francisco: Berrett-Koehler Publishers, Inc., 2003): 4.

[307] Robert Drislane and Gary Parkinson, eds., *Online Dictionary of the Social Sciences* (Athabasca, AB: Athabasca University, 2002), s.v. "Contradictions of Capitalism," http://bitbucket.icaap.org/dict.pl?term=CONTRADICTIONS%20OF%20CAPITALISM (accessed December 12, 2010).

being a deviation from the so-called ideals of capitalism, its existence should instead be seen as the logical consequence of these contradictions. The corporation is fundamental to capitalism, as it is precisely the engine that makes this insane mode of production possible, and it will only follow the programming inherent in its design. It cannot be reformed, anymore than could patriarchy or slavery. Thus capitalism has proven itself to be a monumental failure, as it will soon go down as the largest failed social experiment in the history of the human species. It is said that “the bigger you are, the harder you fall”, and capitalism will fall so hard that it will shatter the Earth completely.

Possible Solutions

By now, capitalism has proven itself utterly incapable of dealing with either its chronic social problems or its ecological problems. The two are often interrelated, as the areas that bear the brunt of social problems also have some of the worst ecological problems, with Haiti being the prime example in the Western Hemisphere[308]. Not only are the ecological problems of capitalism completely unresolvable, but it is becoming apparent that it is both morally bankrupt and thoroughly unsatisfying. Recently, psychologists have started to conduct studies designed to measure the level of satisfaction and perceived happiness, and are finding that ever higher incomes do not lead to increased happiness[309]. In particular, once GDP per capita exceeds $10,000 per year, the correlation between greater wealth and greater well-being vanishes, and other, more subjective factors become more important[310]. What this ultimately means is that, even if it were physically possible to grow without limit (which it is not), the basic principles that define industrial civilization, which can be termed competitive materialism, are both unsatisfiable and undesirable in principle[311]. Thus, the transition from capitalism to a system that is in accord with environmental sustainability is not only necessary for survival, but it is also desirable. In short, if the human species is to have any hope at all of saving both what is left of the biosphere and themselves, capitalism and consumerism as a way of life must be abandoned.

But what kind of political economy, or mode of production, would be best for the planetary biosphere? Fortunately for humanity, there are a couple of options that can take the

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[308] Jared Diamond, *Collapse: How Societies Choose to Fail or Succeed* (New York: Penguin, 2005), 330. Refer back to the Ecological Marxism section for a more detailed description of both its ecological and social problems that plague the country.
[309] James Speth, "Money Can't Buy You Love, or Happiness," *Environment: Yale*, Spring 2008, http://environment.yale.edu/pubs/Money-Cant-Buy-You-Love/ (accessed December 9, 2010).
[310] Ibid.
[311] Joel Jay Kassiola, *The Death of Industrial Civilization: The Limits to Economic Growth and the Repoliticization of Advanced Industrial Society* (Albany, N.Y.: State University of New York Press, 1990), 112.

place of capitalism that are fully compatible with the planetary biosphere, such as the steady-state economy or ecosocialism. The steady-state economy is a system advocated by ecological economist Herman Daly, and it is based entirely on physical laws as currently understood[312]. Unlike neoclassical economics, in which growth is necessary for its survival, the steady-state economy would fully incorporate biophysical limits, especially with regards to non-renewable resources and the laws of thermodynamics[313]. In addition, not only would it incorporate physical limits to growth, but it will also give the economy a conscience mechanism, in that it will place ethical and social limits on growth as well, so that the physical limits are never exceeded[314]. In particular, it would account for the needs of future generations, the intrinsic value of non-human species, and the negative effects produced by economic growth, such as its deleterious effect on moral standards (e.g. competition) and welfare for the less successful[315]. Of course, the steady-state economy need not be stagnant, rather it will be capable of moving from one equilibrium to another, so that the economy could either grow or contract depending on the environmental situation or on the technology available at the time[316]. Thus, if the economy does contract, it will not produce the crises of overproduction that are inherent in capitalism.

Another viable alternative would be ecosocialism, which basically an updated version of regular socialism, except that it would account for the environment. To be sure, socialism thus far has had a dismal ecological record, in particular in the former Soviet republics. First off, the socialist regimes have historically supported the notion of economic growth, much like capitalist

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[312] Herman E. Daly, *Beyond Growth: The Economics of Sustainable Development* (Boston: Beacon Press, 1996), 31-44.
[313] Ibid. 33.
[314] Ibid. 35.
[315] Ibid. 35-36.
[316] Herman Daly, ed., "The Steady-State Economy," in *The Green Reader: Essays Toward a Sustainable Society*, ed. Andrew Dobson (San Francisco: Mercury House, 1991), 145-51.

societies in the West[317]. And accordingly, the environment suffered, from the release of millions of tons of sulfur over the city of Astrakhan, to the high concentration of heavy metals found in industrial areas in Poland[318]. The Chernobyl disaster is the epitome of the ecological woes that plague the former socialist regimes, an accident that involved more than 600,000 people in emergency measures, and left more than 4000 people with cases of thyroid cancer[319]. Chernobyl remains the largest accident in the history of nuclear power[320].

But there are important differences between the pollution generated by the old socialist governments, and the pollution generated by the West. In particular, the environmental crisis in the former Soviet republics originated mostly from industrial pollution, rather than from excessive consumption, as is the case in the United States[321]. Furthermore, much like the steady-state economy, economic growth is not essential to socialism at it is with capitalism[322]. Their historical emphasis on large scale industrial development was probably the result of the fact that most communist revolutions took place in backward countries rather than the advanced industrialized ones, which pretty much set their developmental trajectories for much of the twentieth century[323]. As such, it may possible to reform socialism and other left-wing ideals to be much more eco-friendly than has historically been the case.

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[317] Carolyn Merchant, *Radical Ecology: The Search for a Livable World*, ed. Roger S. Gottlieb (New York: Routledge, Chapman & Hall, 1992), 28.
[318] Ibid. 26-27.
[319] D. Kinley, ed., *Chernobyl's Legacy: Health, Environmental and Socio-Economic Impacts*, Second Revised Version. (Vienna: International Atomic Energy Agency, 2006), 7, http://www.iaea.org/Publications/Booklets/Chernobyl/chernobyl.pdf (accessed December 11, 2010).
[320] Marisa Fernandez, "Scientific Facts On the Chernobyl Nuclear Accident," Green Facts, http://www.greenfacts.org/en/chernobyl/index.htm (accessed December 11, 2010).
[321] Carolyn Merchant, *Radical Ecology: The Search for a Livable World*, ed. Roger S. Gottlieb (New York: Routledge, Chapman & Hall, 1992), 28.
[322] Ibid. 29.
[323] Victor Wallis, "Socialism and Technology: A Sectoral Overview," *Capitalism, Nature, Socialism* (June 2006): 86.

The question remains, what would an ecosocialist society look like, and how would it operate? Unlike the steady-state economy, the emphasis would be much more on social relations than it would be on physical considerations. In particular, it would seek to change the dialectical relationship between humanity and the rest of nature, such as altering the social metabolism so that the alienation of nature from humans would not occur[324]. The end result would be the same, in that it would presumably lead to a society that can live in accord with ecological sustainability. John Bellamy Foster gives a brief description for what ecosocialism would probably be like:

> "Socialism has always been understood as a society aimed at reversing the relations of exploitation of capitalism and removing the manifold social evils to which these relations have given rise. This requires the abolition of private property in the means of production, a high degree of equality in all things, replacement of the blind forces of the market by planning by the associated producers in accordance with genuine social needs, and the elimination to whatever extent possible of invidious distinctions associated with town and country, mental and manual labor, race relations, gender division, etc."[325]

Thus, it would eliminate the need for commodity fetishism, and its subsequent privatization of nature. Under ecosocialism, nature would be considered autonomous rather than something that needs to be controlled or capitalized[326].

Unlike the steady-state economy, ecosocialism does have a working prototype from which the rest of the world can draw from, most notably Cuba. When the Soviet Union

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[324] John Bellamy Foster, "Ecology and the Transition from Capitalism to Socialism," *Monthly Review* (November 2008): 8.
[325] Ibid.
[326] Carolyn Merchant, *Radical Ecology: The Search for a Livable World*, ed. Roger S. Gottlieb (New York: Routledge, Chapman & Hall, 1992), 149.

collapsed, Cuba was forced to undergo what is known as the Special Period, as total trade dropped down by as much as 80% almost overnight[327]. However, contrary to popular belief, the Special Period was not the actual cause of the shift, as Richard Levins notes, but rather it is rooted "in the emergence of the self-conscious community of ecologists, and the transformations of Cuban society since 1959"[328]. The emergence of this "self-conscious community of ecologists" was already well underway during the 1970's and 80's, and experiments in organic and urban agriculture originated as early as the 1980's[329]. All the Special Period did was to allow the "ecologists by conviction" to recruit the "ecologists by necessity"[330]. In any event, the country of Cuba now boasts an impressive system of organoponicos, urban gardens that combine diversification, biological and natural pest control[331]. Urban agriculture now provides over 3 million tons of fresh vegetables across the nation, and soil fertility is maintained by composting, crop rotation, the use of bacteria and fungi to fix nitrogen and phosphorus, and the use of earthworms[332].

There are still several problems it has yet to overcome, most notably in the energy resources sector, where up to 93.9% of its electricity is generated by fossil fuels[333]. However, unlike the United States, Cuba does actually have some policy geared toward environmental stability. Because of this, a study by the World Wildlife Fund estimated that Cuba may perhaps be the only society that has both a high Human Development Index (currently rated at about 0.8),

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[327] Matt Ford, "Can the West Cultivate Ideas from Cuba's 'special Period'?" CNN World, March 29, 2009 http://articles.cnn.com/2009-03-29/world/eco.cubaagriculture_1_soviet-union-cuba-conventional-farming-special-period-cuba?_s=PM:WORLD (accessed December 11, 2010).
[328] Richard Levins, "How Cuba Is Going Ecological," *Capitalism, Nature, Socialism* 16, no. 3 (September 2005): 7.
[329] Ibid. 18.
[330] Ibid. 22.
[331] Ibid.
[332] Ibid. 22-23.
[333] "CIA - The World Factbook -- Field Listing :: Electricity - Production by Source." *The World Factbook*. Central Intelligence Agency, Dec. 2010. https://www.cia.gov/library/publications/the-world-factbook/fields/2045.html (accessed December 11, 2010).

while having a per capita ecological footprint just below the sustainability limit (about 2 global hectares per person)[334]. Provided that it can completely rid itself of fossil fuels completely, ecosocialism does seem like it can also be a viable alternative.

There are still other concepts that can be adopted if either economy is to be truly viable. For instance, once capitalism has been abandoned, there will still need to be a comprehensive plan for non-renewable resources, especially since most of civilization would still be reliant on fossil fuels in the short run. For this, it may be necessary to introduce depletion quotas, whereby limits are placed on consumption and production, instead of trying to limit pollution, since limiting the source will also directly limit the amount of garbage being outputted into the stratosphere, oceans, and continents[335]. Depletion quotas would ease the reliance on nonrenewable resources, while the transition to renewable ones are made, such as solar or wind power. Another useful concept is the idea of industrial ecology, in which the various industrial complexes built today form a closed loop, in which all wastes would be recycled and minimized, instead of an open loop, as it exists today where resources go in one end, and worthless garbage out the other[336]. The monetary system would also have to be completely reformed, and instead the economy would be based on regenerative money instead of a credit based one (which is just a euphemism for "magical pixie dust"), where it is completely localized, based on available physical resources (e.g. wheat, metal, energy, etc.), and focuses not on exchange value, but on

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[334] Chris Hailis, ed., *Living Planet Report 2006* (Gland, Switzerland: WWF International, 2006), http://assets.panda.org/downloads/living_planet_report.pdf 19., (accessed December 11, 2010). I do wonder, though, how they could possibly call Cuba sustainable when most of its electricity is derived from fossil fuels. The only ecological progress explicitly mentioned is in agriculture. If they continue using fossil fuels, they will still collapse due to climate change and resource depletion.

[335] Herman Daly, ed., "Depletion Quotas vs Pollution Taxes," in *The Green Reader: Essays Toward a Sustainable Society*, ed. Andrew Dobson (San Francisco: Mercury House, 1991), 180-83. It goes without saying that such a task will be monumentally easier when economic growth is no longer an imperative.

[336] Brian Milani, *Designing the Green Economy: The Postindustrial Alternative to Corporate Globalization* (New York: Rowman & Littlefield Publishers, Inc., 2000), 138.

use-value[337]. And most importantly, everything would have to become decentralized and community based; bioregionalism would fit this ideal, since under it all communities would base their activities on what is ecologically sound in a given area, and those limits would be decided entirely by nature, such as being limited by biophysical considerations.

Now while the transition from capitalism to some other political economy must be undertaken, actually making the transition is going to be a bit more difficult. The primary reason for this is because, as mentioned in the previous section, the corporations have complete control over the government. As well, having bought out most of the intellectual elite, the people who would otherwise object to this state of affairs, does not bode well for attempting to legitimize any large scale social change or motivating people to do so[338]. Needless to say, if a transition from capitalism is at all going to be possible, sooner or later the corporations and their corrupted politicians will have to be removed from power directly. Perhaps the best way to start is to eliminate corporate personhood entirely, as this will prevent them from having any access to the Bill of Rights. Once this is done, it will become possible to eliminate all corporate special interests from the government, at both the national and international level. And only then will it become possible for any large scale transition from capitalism to take place. One should not underestimate the enormity of this task, especially if the peaceful protest route is taken. And even if they are eliminated completely, it will probably take decades to make the transition, particularly since most people still cling fast to the ideals of consumerism[339].

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[337] Ibid. 166-7.
[338] Sheldon S. Wolin, *Democracy Incorporated: Managed Democracy and the Specter of Inverted Totalitarianism* (Princeton: Princeton University Press, 2008), 159.
[339] The Worldwatch Institute and Erik Assadourian, *State of the World 2010: Transforming Cultures*, Original ed., ed. Linda Starke and Lisa Mastny (New York: W. W. Norton & Company, 2010), 4.

Thus, the transition from capitalism has to be accompanied by a massive paradigm shift. In short, everything would need to be changed, from the way the world is viewed, to what the human race as a whole places value on. A dedicated ecological ethic would be needed in order to go with the transition, where other species would be valued by their intrinsic worth, rather than their so-called economic or "scientific" worth[340]. In particular, there would need to be ethical restraints regarding human and non-human relations (such as eliminating testing on animals), and a much more holistic ethical system must be employed, one that can account for their intrinsic worth[341]. The way science is practiced and understood would also need to be changed, as it is currently over reliant on reductionism. For instance, Fritjof Capra describes how much of modern physics can be easily reconciled with Eastern philosophy in his book Tao of Physics, which places much more emphasis on relationships than on hierarchies, and is strongly empirical[342]. Science based on dialectics would also fit the holistic paradigm quite nicely too, as it presupposes that the whole is a relation among parts, that the parts do not exist apart from the whole, and that change is a fundamental property (for example, chaos theory would fit this quite well)[343]. But whatever method of practicing science is ultimately developed, it will still need to incorporate the principle of falsification, a concept that Karl Popper introduced, since the problem of induction can never be resolved, and thus only theories that can in principle be falsified can be considered scientific[344].

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[340] Herman E. Daly, *Beyond Growth: The Economics of Sustainable Development* (Boston: Beacon Press, 1996), 36.
[341] Marti Kheel, "From Heroic to Holistic Ethics," in *Ecofeminism: Women, Animals, and Nature*, ed. Greta Gaard (Philadelphia: Temple University Press, 1993), 243-71. This section discusses holistic ethics, which includes nonhuman creatures, and contrasts it with "heroic" ethics, which basically means overpowering it, whether it is with regards to medicine, or to scientific inquiry.
[342] Fritjof Capra, *The Tao of Physics*, 3rd Edition-Updated. (Boston: Shambhala, 1991), 34, 189-205.
[343] Carolyn Merchant, *Radical Ecology: The Search for a Livable World*, ed. Roger S. Gottlieb (New York: Routledge, Chapman & Hall, 1992), 151.
[344] John Vickers, *Stanford Encyclopedia of Philosophy*, (Stanford: The Metaphysics Research Lab, 2009), s.v. "Problem of Induction," http://plato.stanford.edu/entries/induction-problem/ (accessed December 11, 2010).

As always, there are obstacles that stand in the way of making the paradigm shift a reality. Unlike the obstacles that challenge the abandonment of capitalism, which occur from the outside, the problems revolving around the paradigm shift occur mostly from within, from the environmental movement and the political Left itself. As far as the environmental movement is concerned, up to this point they have adopted a profoundly anti-human attitude when concerning the relationship between humans and the rest of nature, in particular the Deep Ecologists and organizations like Earth First![345] They are often pessimistic, and as far as they are concerned, nature takes the place of God, and thus will bring divine retribution for human hubris[346]. They tend to fixate mostly on the population problem, where it is viewed more as a battle between the human species and the planet Earth, rather than a problem that stems from social relations, in particular the issue around gender and oppression[347]. Furthermore, carrying capacity tends to be variable, especially when the humans species is concerned, because it is as much dependent on lifestyle choices as it is on biophysical limits; a large, low impact society will likely be more ecologically friendly than a small, large impact society[348]. An example of this would be regarding the consumption of meat, where more than 70% of the grain and cereals grown in the United States are fed directly to farm animals, and it takes 11 times more fossil fuel to grow a calorie of animal protein then it does to make a plant protein[349]. Certainly, if meat consumption were to either be drastically reduced or disappear, enough food resources would be freed to support a larger human population. If the environmental movement is to have any chance of

[345] Tom Athanasiou, *Divided Planet: The Ecology of Rich and Poor* (Athens: University of Georgia Press, 1998), 99.
[346] Ibid. 101-2.
[347] Christine J. Cuomo, ed., "Ecofeminism, Deep Ecology, and Human Population," in *Ecological Feminism*, ed. Karen J. Warren (New York: Routledge, 1994), 93.
[348] Ibid.
[349] "Meat Production Wastes Natural Resources" *People for the Ethical Treatment of Animals (PETA)*. PETA, 2010. http://www.peta.org/issues/animals-used-for-food/meat-wastes-natural-resources.aspx. (Accessed December 11, 2010).

gaining a large amount of support, it must abandon its superiority complex and also account for social realities, rather than fixating itself exclusively on physical concerns.

As for the political Left, they have steadily been losing their legitimacy over the past few decades, ever since they have adopted the philosophy of postmodernism. In particular, they have completely alienated themselves from scientists, the people who know best about the physical details of the ecological crisis at hand. Richard Dawkins in particular has a seething rant to this effect:

> "But don't the postmodernists claim only to be 'playing games'? Isn't it the whole point of their philosophy that anything goes, there is no absolute truth, anything written has the same status as anything else, no point of view is privileged? Given their own standards of relative truth, isn't it rather unfair to take them to task for fooling around with word-games, and playing little jokes on readers? Perhaps, but one is then left wondering why their writings are so stupefyingly boring. Shouldn't games at least be entertaining, not po-faced, solemn and pretentious? More tellingly, if they are only joking around, why do they react with such shrieks of dismay when somebody plays a joke at their expense."[350]

Of course, he is one of many intellectuals and scientists disturbed by the now infamous Sokal Affair, in which physicist Alan Sokal submitted a completely nonsensical article to the Social Text magazine, and got it published mainly because it conformed to their ideology, rather than being representative of scientific fact[351]. The Sokal Affair has now become the epitome of the political Left, precisely because certain segments of the movement refuse to believe in the

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[350] Richard Dawkins, "Postmodernism Disrobed," Richard Dawkins Foundation, entry posted March 31, 2007, http://richarddawkins.net/articles/824-postmodernism-disrobed (accessed December 14, 2010).
[351] Sokal, Alan. "A Physicist Experiments With Cultural Studies." *Alan Sokal*. New York University, June 1996. http://www.physics.nyu.edu/sokal/lingua_franca_v4/lingua_franca_v4.html. (Accessed December 11, 2010).

existence of the real world. While they are correct in pointing out that perceptions of the real world are heavily subjective, it does not mean that it does not exist. In throwing this idea out, they have also thrown out all standards of rigor. Thus, in effect, fewer and fewer people are taking them seriously as time goes on. As capitalism continues to trample both nature and humans underfoot, the last thing the Left needs is to alienate everybody else. It is true that scientists are only human, complete with biases and prejudices, but throughout the twentieth century they have also played a critical role in whistleblowing. Rachel Carson alerted the public to the dangers of chemicals like DDT with the publication of Silent Spring, while Carl Sagan focused mostly on preventing the start of a nuclear war[352]. And in recent times, James Hansen, climatologist from NASA, has repeatedly spoke of the dangers of catastrophic climate change should humanity continue course. Scientists can play a critical role in legitimizing the position of the political Left, if they are given the chance to, although it is true that they do need to come to terms with the dangers that scientific and technological progress brings.

Last but not least, the most obvious changes that need to be made is to adopt the appropriate technologies needed to actually live on the planet sustainably. These technologies are the familiar "eco-tech" solutions, which are solar power, wind power, geothermal, tidal power, smart grids, green chemistry, recycling, organic farming, etc. All of these are examples of soft technologies, a concept introduced by Amory Lovins, because of their low impact on the environment[353]. However, it is important to note that most of these energy sources are either

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352 In particular, see the peer reviewed article called *Nuclear Winter: Global Consequences of Multple Nuclear Explosions*, published in *Science* a couple of decades ago. They conjecture up some very grave consequences for the globe should a nuclear war take place.

353 Amory Lovins, ed., "Soft Energy Paths," in *The Green Reader: Essays Toward a Sustainable Society*, ed. Andrew Dobson (San Francisco: Mercury House, 1991), 180-83.

extremely localized, or have very low Energy Return on Investment ratios. Thus, in order for any of them to be truly viable, they must all be decentralized and extremely localized[354]. Not only is it necessary for physical reasons, but it is also desirable, since it will be extremely conductive to fostering community ethic, and restore a healthy relationship between humans and nature[355]. Advanced technology need not be abandoned, as it has its place in a sustainable civilization, for instance the development of thin film solar panels[356] or super-efficient architecture, where energy and resource efficiency is designed into the building from the get go[357]. Instead of the current fossil fuel economy, we could probably switch to the Electron Economy, in which everything runs on electricity and is hugely more energy efficient, and certainly possible with solar and wind power[358]. Perhaps the best news about our situation is that it a high standard of living, and high technology does not need to consume a large amount of energy and resources in the first place. It is certainly possible to have them without the massive amounts of waste currently generated by the system. The one last thing that has to go is the idea of Planned Obsolescence, since it is a doctrine based entirely on the needs of the market[359]. Instead, everything should be built to last, and to be repaired. It is certainly within the technological capabilities of modern society, all that is lacking is the political will to make it happen.

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[354]The Ecologist, ed., "Decentralization," in *The Green Reader: Essays Toward a Sustainable Society*, ed. Andrew Dobson (San Francisco: Mercury House, 1991), 73-76.

[355] Ibid.

[356] Oregon State University (2010, April 20). *Advance made in thin-film solar cell technology*. *ScienceDaily*. Retrieved December 11, 2010, from http://www.sciencedaily.com/releases/2010/04/100420132835.htm

[357] Declan Butler. "Architecture: Architects of a Low-energy Future." *Nature News*. Nature, 2 Apr. 2008. http://www.nature.com/news/2008/080402/full/452520a.html (Accessed December 11, 2010).

[358] Hoexter, Michael. "The Electron Economy: the Energy Future Is Nearer than You Think… « Green Thoughts." *Green Thoughts*. 12 Mar. 2007. 15 Dec. 2010. <http://greenthoughts.us/2007/03/12/the-electron-economy-the-energy-future-is-nearer-than-you-think/>.

[359] See the Story of Stuff, by Annie Leonard, for more information about planned obsolescence. Likewise, refer back to the previous section for more details.

Conclusions

It should now be apparent that, unless a massive paradigm shift occurs over the next few decades, there is a strong possibility that civilization will not survive the 21st century. The challenges that face us are certainly daunting, and this time around there is no single answer to the crisis at hand. Technology is not going to save us this time around, especially since our high technology is in the midst of undermining their own conditions for reproduction. If we are to have any hope of surviving into the 22nd century, we have to do more than just look for technological bullets.

Luckily for us, the crisis at hand is the result of overconsumption and overindulgence, by a minority who are at the top of the social hierarchy. This is good news because it means that, on the grand scheme of things, we need far less energy and resources than we consume in order to survive, enjoy the benefits that modern technology has brought, and live a meaningful life. The real problem is being able to convince people that less is more. At the moment, the entire world has been convinced that the only way to prosperity is to adopt the American way of life, with its high meat consumption, automobiles, fast food restaurants, commuting, etc. The United States, therefore, must be the first to change their way of life.

It is not going to be an easy task. For one, special interests are now firmly entrenched in the US government, and it is now very unlikely that the elected officials will do anything other than cater to those groups, unless there is a united opposition group against them. And while local action is a good start, it can only take one so far. We must remember that, ultimately, the problems that face humanity are global in nature, and can only be resolved through global action. Everything will have to change if we as a species are going to make it through.

At the same time, one should not expect that a single political party, or a single ideology is going to save us, lest we fall into the trap that the Russians or the Germans did earlier in the twentieth century. While the crisis can certainly be pinpointed to a certain set of lifestyle practices and modes of production, such as capitalism, that does not mean that its critics are necessarily on the right either. Perhaps the biggest problem nowadays is that the environmental movement is not anywhere near organized enough to make anything happen. Instead, what usually seems to happen is that the various environmental movements form their own cliques and own ideas for what they consider to be ecologically superior, to the exclusion of everybody else. Greenpeace is doing one thing, and the Sierra Club is doing another, and Earth First! does yet another thing. The political Left is much the same way, where most of them are so hopelessly entrenched in their own ideologies that it does not even occur to them that other people agree with some of their ideals too. If the Earth is going to be saved, the various groups have to let go of their ego, and stop trying to run their own little empires. Politics is a lot like a game of chess; the chances of victory are the greatest when the entire army works together toward a common goal.

In short, we environmentalists have a long way to go before people start to listen, and take action themselves. Instead of mutual antagonism, the public needs to instead be inspired to take action and become environmentalists. But before that can happen, they must first be made aware. It is not enough to be rationally aware, mind you, but they must also be impassionate about it too. And while the green parties do not have any power, at least this sort of awareness is starting to grow. Thus, this paper will leave on a note of hope, and the understanding that knowledge is only half the battle. For as long as there are people fighting for our rights and for our future, there may yet be hope for the planet and for the human species.

For More Information:

- My Personal Website: **http://sites.google.com/site/planetarycrisis/**

  This will be my personal webpage, where I will cover issues regarding the planetary crisis at hand. It will incorporate both science and social science. Below are websites that I have frequented over the years, and even been an active member on a couple of them. They are always up to date, and run entirely by professionals. I did not actually use them as references for this paper, due to the need to diversify my sources.

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