An Ecological Future: Marx and Wu-Wei

By Michael Perelman

Ecology

China is a land of great contradictions for me -- over and beyond the market contradictions that Marx identified. Admittedly, some of these contradictions might be illusory because of my superficial knowledge of the country.

Last January, I had the privilege of visiting the Humble Administrator's garden in Suzhou. I was struck by the enormous amount of workers he must have commanded to reshape nature so completely. The Grand Canal represents an even more massive mobilization. At the same time, nature can rebel against efforts to control it, such as when the excessive weight of water held behind a dam sets off a devastating earthquake.

Almost four decades ago when U.S. visitors first began to visit China after the revolution, they reported the fantastic yields made possible by traditional Chinese polyculture. Of course, these farmers' great achievements went for naught, in the sense that many people still remained impoverished. At the same time, I realized that historically the lack of sanitary facilities associated with this system of agriculture led to a devastating epidemic of intestinal worms, which made the challenge of feeding so many people even more difficult.

An American Missionary, Gerald Freeman Winfield, described the extent of the problem as it existed in pre-revolutionary China. Based on a survey of the prevalence of one intestinal parasite, Ascaris -- not even the most dangerous parasite -- he estimated:

If all these worms were strung together they would form a worm 1,221,000 miles long-long enough to wrap around the equator almost fifty times. In total they would weigh 130,900 tons, or equal in weight about two million adult Chinese. [Winfield 1950, p. 129]

Later, I came to understand that even with better sanitation, bunching too many life forms together -- producing rice, fish, pigs, and fowl in a confined space, without sufficient protections -- still provides an ideal habitat for life-threatening organisms, such as those which caused the outbreak of SARS.

Obviously, regional contradictions abound in a country as extensive as China. About two decades ago, I read about the periodic famines that swept across Northern China.

During the 1920s, U.S. scientists reported back on the difficulty of supporting so many people with traditional methods on infertile land. Walter Clay Lowdermilk, a forester who was the most insightful of these visiting scientists, found beautiful forests surrounding temples in North China,

but the rest of the hills were denuded of trees. Poor peasants with too little a margin of survival had little choice but to farm the hillsides. Over the centuries, erosion left the land infertile. The rains were strong enough to cause flooding and erosion, causing the water to rush too quickly to replenish the earth. Lowdermilk's message was the importance of protecting the soil, but the soil and water are only part of a complex web of life.

The shortage of water in the North and Northwest -- made worse by the loss of the protective cover from the land, especially on the steepest land -- accounted for much of the difference between the poor yields there and bountiful production of the rice lands. Yet, China has an ancient history of engineering water.

Today, another factor affects the interplay between soil and water -- energy. The connection with energy is most obvious in hydroelectric projects, but it affects virtually all aspects of energy production. In my country, almost half of water withdrawals go for the production of electricity by turning water into steam. At the same time, natural gas producers inject huge quantities of water into the ground to extract the fuel. Even worse, is the wasteful practice of turning gooey oil sands into usable petroleum, while thoroughly polluting the enormous quantities water used in the process.

Although fresh water is more scarce than petroleum, it gets far less attention. Moving from the macro scale of energy production to the small scale of a polycultured rice paddy increases the complexity of understanding the environmental impacts of technologies. Of course, the overriding challenge of global warming dramatically underscores the interaction of energy use and water, in part, because the oceans have provided a sink for carbon dioxide.

The ultimate question that these visiting scientists raised is still relevant. How can one learn to create a bountiful life without disrupting the natural systems upon which we ultimately depend?

Economics

The ongoing crisis in the world economy signals the bankruptcy of traditional economics. The ongoing environmental destruction should be equally damning, but many people still think that markets offer some sort of environmental answer. At the same time, after many decades of ridicule, Marx's economics are now commanding more attention.

Since this conference is intended to address environmental challenges, I will pass over Marx's powerful analysis of economic crises after this brief acknowledgment of its importance for understanding the current economic mess. Let me mention two glaring failures of economics in so far as the environment is concerned. The first concerns the idea of discounting; the second is less obvious, but increasingly important.

By discounting, economists mean that the value of an asset one year in the future is worth only a fraction as much as it is today. Economists treat the discounted value n-years into the future as the current value multiplied by that same fraction n-times. Since economists often use the same discounting fraction that business uses, consequences a year from now are only 80 or 90 percent as important as an immediate effect. These discounted values fall off quickly, leaving problems a few decades in the future to sink into insignificance.

The second problem deals with the earlier discussion of ecology. Economics frames everything as a price, but price formation collapses everything into a crude measure that takes no account of the complex interactions suggested by the earlier discussion of agriculture. A complete list of the complex interactions that modern ecologists have discovered would fill volumes, but they have only scratched the surface.

This problem compounds the first defect of ignoring either the gradual accumulation of environmental damage or the buildup of pressures that suddenly create a catastrophe.

Value Theory and Reproduction

While the discounting of conventional economics expresses a disregard for the future, Marx's value theory implies a sensitivity to environmental concerns. I am not thinking of the textbook value theory that simply adds up the labor embodied in a commodity, but a richer kind of value theory usually attributed to Marx -- but a fuller value theory that Marx never had time to flesh out.

Marx taught that a proper theory of value must reflect reproduction costs rather than just the immediate production costs. This insight about reproduction costs has two divergent implications, which are important for understanding both capital and capitalism.

Considerations of reproduction costs complicate Marx's theory of value, but they also enrich it. In addition, reproduction costs also open up a sharp critique of capitalism. At the time of an investment, nobody can know the future. For example, business has no way of anticipating when future technology will make a new capital good obsolete.

The declines in reproduction costs are especially severe during periods of rapid technological change. This phenomenon was abundantly clear during the early decades of the personal computer, when each new generation of computers would start out with a price something like $10,000, then decline relatively rapidly until it approached $1,000, at which time a new generation would appear. While the price declines were relatively predictable, the timing was not.

Marx explored this phenomenon in discussing the work of Charles Babbage. Babbage, who, like Isaac Newton, was a Lucasian professor of mathematics at Cambridge, attempted to construct the

first computer in the early nineteenth century, more than a century before the first working computer appeared. Of course, Babbage's computer was based on mechanical power rather than electronics, but it still required parts with very precise specifications. In carrying out his project, Babbage had to work with many workshops, teaching him a great deal about modern manufacturing.

Based on this experience, Babbage published an extraordinary book, The Economy of Machinery and Manufactures, which went well beyond any contemporary work of political economy in creating a realistic analysis of modern production. The significance of rapid technical change struck Babbage, who claimed:

... improvements succeeded each other so rapidly that machines which had never been finished were abandoned in the hands of their makers, because new improvements had superseded their utility. Babbage 1835, p. 286]

Babbage's rule of thumb was that the cost of an original machine was roughly five times the cost of a duplicate (Babbage 1835, p. 266). He used the example of frames for making patent net that initially sold for twelve hundred pounds. A few years later, they cost only sixty pounds (Marx 1977, p. 528; Babbage 1835, p. 286 and 214). According to Babbage's estimates, in terms of value theory, one hour of labor embodied in patent nets that were only a few years old would be equivalent to three minutes of direct labor embodied in a new machine.

Reproduction Costs and the Environment

Reproduction costs have important environmental implications. While the monetary costs of reproduction may fall, environmental costs increase over time. These rising environmental costs may well swamp the apparent efficiencies that struck Babbage and Marx.

At the same time, new technology for extracting resources may be able to obscure the danger of impending scarcities, because rapidly rising, but unpriced, future reproduction costs go unnoticed.

Marx's observation warns that looking at the exploitation of resources only in terms of immediate production costs is ridiculous. In this sense, Marx's theory is more environmentally advanced than conventional economics.

Imagine a person walking into an automobile dealership, offering to pay the cost of extracting the automobile from the premises -- maybe $.10 worth of gasoline plus a nickel, representing a fifty percent markup. Nobody would take such an offer seriously, yet the market prices resource extraction in a similar fashion.

Markets, of course, are supposed to signal when resources are becoming scarce, so that people take measures to economize. In the United States, there was a bird known as the passenger pigeon, which was so numerous that flocks would actually block out the sun. Hunters would fill large wagons with the birds. They had a ready market for their produce because the bird tasted like chicken, making pigeon prices similar to those of chickens. Because of this relatively tight relationship, the price of these birds stayed relatively constant right up to the time that they became extinct (Perelman 2003, pp. 67-77).

In the case of the passenger pigeons, the warning from the price system was nonexistent. Of course, the world has survived without passenger pigeons, but fossil fuels and water, which are central to our lives, must be treated with considerably more care. Markets that rely on simple production prices blind society to future dangers.

Ironically, Marx's value theory is often wrongly dismissed for having neglected natural resources. For example, in a widely circulated article, Paul Samuelson charged Marx with ignoring "the patent fact that natural resources, too, are productive" (Samuelson 1957, p. 894). However, with his concept of reproduction costs, Marx offered a framework well in advance of contemporary economics. The wanton depletion and degradation of resources should be taken into account in evaluating economic activities, even though the price system pays no attention to such matters.

Reproduction Costs and Technology

Taking account of reproduction costs also throws light on another problem with the presumed efficiency of market-oriented investment. The economic history of the later part of the nineteenth century, when industry was first learning to harness the power of fossil fuels, illustrates this phenomenon. At the time, rapid devalorization of capital, which would have been familiar to Babbage, was sweeping across the U.S. economy. For example, not long after Marx wrote, the American steel magnate, Andrew Carnegie, upon hearing about a superior design for a rolling mill ordered his young assistant, Charles Schwab, to raze and reconstruct an existing three-month-old mill (Livesay 2000, p. 130).

Unlike the 20th century economist, Joseph Schumpeter, who wrote about creative destruction (Schumpeter 1950), Babbage emphasized what might be called destructive creativity. What could destructive creativity mean?

In a laissez-faire economy, profits become impossible when the sequence of technical change becomes too rapid. As the Carnegie example shows, when the pace of technological change reaches a threshold, capitalists may not be able to operate their stock long enough to recoup their initial outlays. Such capital destruction became so widespread in the late 19th century United

States that the economy experienced a prolonged crisis, even though the output was growing at the time.

The response of business was to organize trusts and cartels to limit the competition -- in effect to abandon capitalism. In this new environment, business had little need to invest in new technologies. This episode illustrates how capitalist production tends to slow down the rate of technical change (Perelman 2006). Over time, the effect of this technological slowdown becomes obvious. The lost dominance of the U.S. automobile industry offers a convenient example of this phenomenon.

Simultaneously, during times of rapid technological change, the lure of great profits makes investors more likely to foolishly rush into projects that promise very fast payoffs. For example, in the late 1990s, extravagant predictions about the Internet led business to overinvest. In two years, business companies spent an estimated $35 billion to lay an estimated 100 million miles of optical fiber -- more than enough to reach the sun.

After this flurry of investment, only about 2.6 percent of the capacity was actually being used (Romero 2001; Blumentstein 2001). By the time the demand increases enough to require this much optical cable, the technology embodied in this investment may well be obsolete. This overinvestment in Internet-connected ventures eventually led to the dot.com bust and set the stage for the later crisis, which was incorrectly explained as a housing crisis.

The complication of reproduction costs throws all claims of market efficiency into question and suggests the need for regulation to prevent the irrational use of scarce resources. In addition, disregard for reproduction costs can misdirect investment, as well as the technological and scientific efforts required to meet social needs. More specifically, capitalism is unable to rise to the challenge of creating an adequate response to the global environmental crisis.

Value Theory and Capitalist Control

Marx began with the obvious recognition that capitalist production crudely relies on "sweating" labor; that is, driving workers as intensively as possible. Given his insights into reproduction costs, Marx could not help but recognize how labor-saving technology was already dramatically reducing the direct labor embodied in commodities in the mid-nineteenth century.

Conventional economic theory teaches that as the wage share of total costs falls, the rationalization for concentrating on labor costs diminishes. Yet business still tends to emphasize cutting labor costs. For example, Michael Piore's survey of 60 New England factories found that employers instructed engineers to single-mindedly pursue the goal of developing methods of

reducing labor inputs, without regard for the more rational criterion of overall cost minimization. He went on to say:

Virtually without exception, the engineers distrusted hourly labor and admitted a tendency to substitute capital whenever they had the discretion to do so. As one engineer explained, "if the cost comparison favored labor but we were close, I would mechanize anyway." [Piore 1968, p. 610]

Piore's quote suggests a side of the class struggle that usually passes unnoticed, unless one recognizes capital as a social relation. In effect, Piore's survey revealed that capitalists' urge to control labor is so strong that they ignore opportunities that might be both profitable and socially beneficial.

Marx explored the irrationality of this obsessive concentration on the minimization of labor costs. He noted an effect of modern technology that went beyond the reduction in direct labor. He observed that modern technology required a new kind of labor. Remember that this insight came a century before economists began to prattle about the information economy. In particular, Marx observed that in a rational economy, the modern worker:

... steps to the side of the production process instead of being its chief actor. In this transformation, it is neither the direct human labour he himself performs, nor the time during which he works, but rather the appropriation of his own general productive power, his understanding of nature and his mastery over it by virtue of his presence as a social body -- it is, in a word, the development of the social individual which appears as the great foundation-stone of production and of wealth. The theft of alien labour time, on which the present wealth is based, appears a miserable foundation in face of this new one, created by large-scale industry itself. As soon as labour in the direct form has ceased to be the great well-spring of wealth, labour time ceases and must cease to be its measure, and hence exchange value [must cease to be the measure] of use value. [Marx 1973, p. 705]

Marx went deeper into this glaring contradiction between the emphasis on the minimization of labor costs and the nature of modern technology, which concentrates on the minimization of the role of direct labor in production. He explained that:

... to the degree that large industry develops, the creation of real wealth comes to depend less on labour time and on the amount of labour employed than on the power of the agencies set in motion during labour time, whose 'powerful effectiveness' is itself in turn out of all proportion to the direct labour time spent on their production, but depends rather on the general state of science and on the progress of technology, or the application of this science to production. [Marx 1973, pp. 704-5]

An apocryphal story about Henry Ford, an inveterate driver of labor, illustrates Marx's point. An efficiency expert, accompanying Ford on a walk through one of his factories, pointed to a man sitting with his feet on a desk, apparently doing nothing. The expert quickly identified the waste associated with the idling man. Ford, however, disagreed with this appraisal, explaining that a single idea that the man proposed last year saved the company $1 million.

Some people might misread Marx's observation about the declining quantitative importance of direct labor to mean that Marx's theory is invalid for a modern economy -- if, by a modern economy, we mean the economy that exists today. Of course, unlike academic economics, Marx was analyzing the way the economy actually works, not the way it should ideally function. Value reflects a major operating principle of a flawed system.

Of course, the problem does not lay in his theory of value, but rather with the subject that value theory describes. Marx realized that the social relations of capital do not just override the logic of profit-maximization. They stand in the way of developing an organization of society that can best utilize and take care of its resources.

People and Technology

Technology is, of course, part of the solution to the environmental crisis. Any adequate solution will require a different kind of technology, not one dedicated to the short-run profits of an exclusive group who have control of capital. Nor can this technology be nothing more than a crude attempt to blast wealth from the earth. It must be directed toward a more harmonious relationship with the environment.

This technology will not fall from the sky; instead, it must engage the enthusiasm as well as the intellects of the masses. Our challenges are too extreme to think that a small group of technocrats with their feet on their desks could come up with adequate answers on their own.

Presently, people are calling upon technology to eliminate waste, but the greatest waste is human potential. Society must find a way to spread education as widely as possible, while encouraging all people to get involved in making the world a better place. In the United States, class and race have detrimental effects on educational opportunities. I understand that China may be moving in the right direction now that the country is deciding whether to increase the years of compulsory schooling.

Education means more than just filling students with book learning. Proper education will help students discover new interests and foster talents of which students were unaware.

Formal education, by itself, no matter how enlightened, is insufficient to meet the current needs. People must be given the opportunity and the encouragement to fully develop their own

potential at all stages of their life, on and off the job. The kind of investment Piore found, biased toward the control of labor, has no place in a rational world. Instead, Marx's vision of workers combining labor and science must become a reality. Workplaces would offer opportunities for "idling" -- times at which workers could be learning as well as teaching others.

A rational system would also be willing to pay attention to traditional methods of production, such as the ancient Chinese agricultural practices, while avoiding the errors associated with such techniques. Although such traditional producers may not have a full understanding of their environment, they also are a reservoir of valuable information that has so far eluded scientific ecologists.

The time has come to turn away from the destructive capitalist practices -- to nurture both people and nature -- to learn from Marx, learn from nature, and learn from the people.

Marx and Wu-Wei

I understand that the early eighteenth century French Physiocratic School of economics took their inspiration for their laissez faire theory from the ancient doctrine of Wu-Wei. To their credit, the Physiocrats did have an environmental gloss because these economists followed the French tradition of emphasizing agriculture. In fact, the name that the Physiocrats took for themselves meant the rule of nature. When Adam Smith appropriated much of the Physiocratic doctrine, he explicitly cast aside the French emphasis on nature. Instead, he set the tone for his work by plagiarizing a couple of French articles describing the crude manufacture of pins. For the most part, Smith's legacy continues to this day.

I have trouble believing that the Chinese Taoists intended to propose anything as naive as modern economics. The idea that merely limiting government activity would lead either to prosperity or to freedom is a purely European invention.

Perhaps, however, Wu-Wei's idea of effortless action might be more easily reconciled with the ideas of Karl Marx than with a society in which people are expected to cede power to unelected capitalists.

In a Marxist Wowed world, workers would learn about science while scientists would learn about work. One man would not be "idling" while hundreds of other workers are toiling. Instead, all workers would be both "idling" and toiling.

The introduction of labor-saving technology has certainly not done much to promote idling, except for the unemployed. For example, people in the United States work longer than in other advanced countries. In the United States between 1970 and 2002, per capita annual hours of work rose 20 percent, while falling in most other advanced economies, perhaps because a

stronger labor movement has been able to slightly moderate market forces (Organization for Economic Co-operation and Development 2004, p. 6).

Although conventional economics recognizes the importance of education and training, it refers to workers' acquisition of knowledge and experience as human capital, as if what is most human can be reduced to something comparable to an inanimate object.

In my new book manuscript, *The Invisible Handcuffs of Capitalism: How Market Tyranny Stifles the Economy by Stunting Workers*, I go into detail about how the current economic system prevents people from developing the kind of capacities that would enhance the scientific approach to production that Marx was describing.

The book also describes the lengths to which economists have gone to make this deficiency invisible by framing economics around transactions, putting aside all matters of work, workers, and working conditions. Finally, this manuscript explores the way that capitalist performance will continue to fall behind the technical capacity of society because of this inability to take advantage of human potential.

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