

## Recycling for Sustainability<sup>i</sup>

John Ikerd<sup>ii</sup>

We can never do just one thing. This is the first rule of ecology – everything is connected. This also is a basic principle of quantum physics, at least for all things at the subatomic level. So anytime we do anything to protect the natural environment, such as recycling, we are never doing just that one thing. What we choose to do or not do to protect the environment affects everything connected to the environment, which includes just about everything, everywhere. Some of those effects may be small and others large, but everything we choose to do, or not do, matters.

Sustainability is the broadest, most inclusive concept of environmental stewardship. Sustainability is about meeting the needs of the present while leaving opportunities for the future, recognizing the inherent dependence of human society of the resources of nature. It's not just about caring for the natural environment but also about caring for the social environment – families, communities, and cultures – because environment and society are critically interconnected. Sustainability also is inescapably about economics, because the economy is the means by which we, as individuals, relate to our natural and social environment in complex societies. Nature, society, and economy are all integral parts of the same interconnected whole. Sustainability embraces the biospheric reality of holism.

Sustainability ultimately is about energy. Issues such as environmental pollution, peak oil production, and global climate change, at their roots, are energy issues. Everything of benefit to humans relies on energy. Our houses, clothes, cars, all require energy to make and energy to use and in fact are made of concentrated energy. Every useful human activity – working, thinking, managing – requires energy.

According to the first law of thermodynamics, energy can be used and reused but can never be created or destroyed, although it changes in form each time it is used. However, according to the second law of thermodynamics, the law of entropy, each time energy is used and reused, some of its *usefulness* is lost. Whenever energy is used, it is always transformed from more concentrated, organized forms to more dispersed, less concentrated forms, as when we burn fuel in an automobile or fuel our bodies with food. In fact, the usefulness of energy arises from its natural tendency to disperse. Even though no energy is lost through use, it must be collected, reorganized, reconcentrated, and re-stored before it can be reused. All of this requires energy – energy which is no longer available to do anything else. This is the essence of the law of entropy and entropy is inevitable.

Although less widely recognized, the same basic principles apply to social energy as well as physical energy. All human resources – labor, management, innovation, creativity – are products of social relationships. No person can be born, reach maturity, and become a productive worker

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<sup>ii</sup> John Ikerd is Professor Emeritus, University of Missouri, Columbia, MO – USA; author of, *Sustainable Capitalism*, <http://www.kpbooks.com>, and *A Return to Common Sense*, <http://www.rtedwards.com/books/171/>, Email: [JEIkerd@centurytel.net](mailto:JEIkerd@centurytel.net); website: <http://web.missouri.edu/~ikerdj/>.

or citizen without the help of other people, including their families, communities, and societies. All organizations – businesses, communities, economies – depend on the ability of people to work together for a common purpose, which depends upon the civility of the society in which they were raised. It takes energy just to maintain the civility and sociability of society, and this energy is not available for any other productive use. This is the essence of social entropy and it also is inevitable.

The basic challenges of sustainability today stem directly from our economic systems – the systems by which people in all complex societies facilitate their individual relationships with each other and with our natural environment. Today’s capitalist economies inevitably disperse, disorganize, and deplete both physical and social energy in the process of producing things of use to people. However, such economies do nothing to reconcentrate, reorganize, and regenerate the energy they extract from nature and society. Maximum economic efficiency requires that natural resources be used to produce things that have economic value. Maximum economic efficiency requires that people relate *impersonally*, compete rather than cooperate, and spend their time on things that have economic value. Doing something for the benefit of someone else has no economic value.

It makes no economic sense to invest in protecting the natural environment or conserving natural resources, if the benefits of a healthy, productive environment are to be realized by someone of some future generation. It makes no economic sense to invest in the sociability and civility of families, communities, and societies, if the rewards of positive productive relationships will be realized by some future society. All economic value is individual in nature. In economics, a society is nothing more than a collection of individuals. Thus, anything expected to happen after a person is dead is of no economic value.

The diminishing time-value of economic benefits is clearly reflected in market rates of interest, which heavily discount the value of future events. For example, economic benefits expected to accrue a decade in the future are worth less than fifty cents today for each dollar expected later. Potentially cataclysmic events such as fossil energy depletion and global climate change are of little *economic* importance today because their catastrophic impacts on humanity are still beyond the five-to-ten year planning horizons of most corporations. From everything we know about the basic nature of natural ecosystems and human societies, today’s economic planning horizons are simply too short to ensure the long run sustainability of humanity.

No matter how much we might wish otherwise, we must confront the reality that little purely economic incentive exists to support recycling, particularly the type of recycling activities necessary for long run sustainability. We should continue to promote recycling initiatives that have the potential for immediate benefits or short-term paybacks for recyclers’ investments. In such cases, the economic incentives make the risks of recycling investments more acceptable. But, we should not limit our efforts to this “lowing hanging fruit.” Ultimately, the sustainability of human life on earth depends upon the willingness and ability of both individuals and businesses to look beyond their individual economic self-interests and to act with true ecological and social integrity.

Recycling has the potential to be an important strategy for long run sustainability, if we are willing to look beyond short-run economics. The Missouri Recycling Association has a special project that collects success stories demonstrating how “recycling strengthens the environment, strengthens communities, and strengthens the economy.” So the ecological, social, and economic dimensions of sustainability certainly do not represent new territory for those promoting recycling in Missouri.

First, recycling can certainly strengthen the natural environment. Recycling that reduces toxic wastes and environmental pollution obviously provides immediate benefits to human health. But reducing wastes in general also conserves natural resources, protects natural ecosystems, and encourages biological diversity, upon which the long run sustainability of the biosphere ultimately depends. Waste is simply energy that has been transformed, but not used, in the process of doing something useful. Thus, waste is wasted energy. Toxic waste can be thought of as “negative energy.” It reduces the usefulness of other resources, and thus, requires additional energy to mitigate or offset the resulting loss of usefulness. Entropy is inevitable but waste is not.

Today’s global economy is critically dependent on fossil energy. In fact, the tremendous material progress of the industrial era has been possible only because of the relative abundance of fossil energy. However, the days of plentiful, low cost fossil energy are nearing an end, if not already over. Global petroleum is expected to be the first fossil energy source to peak, if it hasn’t already, and after the peak, will slowly but inevitably decline. Other sources of fossil energy, including natural gas and coal also will peak and decline, more quickly if they are substituted for petroleum, more slowly if we reduce our total energy use. One of the most effective means for reducing future energy use is to turn energy wastes into energy resources through recycling. Waste is simply potentially useful energy that we don’t yet know how to use. Recycling turns wasted energy into useful energy, reducing our reliance on declining fossil energy and enhancing long run sustainability.

Solar energy is the only source of energy available to offset energy inevitably lost to entropy. So even if we could completely eliminate waste, sustainability would require that we still collect and use solar energy to offset the energy inevitably lost to entropy. Living ecosystems, including plants, animals, and people, are the only means we have of collecting and storing the solar energy needed to ensure sustainability. Most plants are capable of capturing solar energy and converting it to the carbohydrates, proteins, and fats which provide energy for other living species. Humans also have the technical capacity, if not the inclination, to capture and store solar energy. We just do it with windmills, dams, and photovoltaic cells instead of green leaves. In addition, all living species have the capacity to be productive, meaning to do something useful, while devoting a significant portion of their life’s energy to renewal and regeneration. Since no individual living organism lives forever, reproduction or regeneration is the only concept of long run sustainability that we know.

However, the regenerative capacity of any ecological species, including human, depends upon the biological diversity of their ecological communities. All life is interconnected. We humans, being a living species, are ultimately dependent upon other living species for the energy that not only sustains our bodies but also the minds that must devise and implement technologies that capture and store solar energy. We cannot eat the sunlight, wind, or water, or the solar

generated electricity. As biological beings, we are and shall remain critically dependent upon the biological diversity of natural ecosystems. And we cannot maintain the diversity of the biosphere of which we are part unless we learn to avoid or recycle our potentially toxic wastes.

Recycling can also help protect the biosphere and sustain humanity by reducing atmospheric carbon. The current threat of global climate change is widely attributed to a buildup of greenhouse gasses in the atmosphere – in particular, carbon dioxide. Carbon dioxide is a natural byproduct of energy use – a consequence of the inevitable transformation and dissipation of energy. The current buildup of atmospheric carbon is almost certainly related to the dramatic increase in use of fossil energy over the past several decades, as industrial economic development has grown in magnitude and spread around the globe.

However, the buildup of greenhouse gasses is not due solely to fossil energy use but also to the destruction of natural ecosystems. Carbon is released into the atmosphere when plants and animals either become food for other species or die of natural causes and decay. Carbon is also released when organic matter stored in the soil is exposed to air. Living plants, on the other hand, sequester carbon from the atmosphere in the process of transforming solar energy into biological energy. Thus as forests have been cleared and used for paper and building materials and soil organic matter has been depleted by mechanical tillage, the amount of carbon released into the air has been increased while the biomass of living organisms capable of sequestering and storing carbon has been depleted.

Recycling of paper and other forest products has the potential of restoring forest. Recycling of biological wastes could also help to restore the organic matter of soils. Recycling has the potential to reduce the release of carbon into the atmosphere, increase carbon sequestration in forest and soil, and thus helping to mitigate the threat of global climate change and to offset the energy lost to entropy. Recycling can be an important means of ensuring ecological sustainability.

Second, recycling can strengthen communities, helping to ensure social sustainability. Recycling for ecological sustainability brings people together. Recycling for purely economic reasons takes place within private business organizations and typically is not even referred to as recycling but as resource utilization. So when we speak of recycling, we typically are referring to group efforts to encourage recycling for reasons that are not purely economic. Economic benefits may be involved, but whenever expected economic benefits fall short of economic costs, the “community” invariably bears some part of the costs or recycling simply doesn’t happen. The recycling “community” may be a grassroots group, social clubs or civic organizations, or local, state, or federal government. The Missouri Recycling Association is one such a community. Regardless, in the absence of people willing to work together for the common good, recycling just doesn’t happen.

Most such common interest groups renew social energy without even being aware of it, and thus help to offset social entropy. Members spend time and energy getting to know each other, learning to respect each other, finding ways to work together, sharing responsibilities, and often build caring and trusting relationships. Such efforts help offset the effects of the impersonal competitiveness of economic relationships that inevitably weaken the sense of social

connectedness and deplete social energy. In the process of working together for the common good, recycling groups form relationships that not only strengthen their communities but also help create a sustainable human society.

Even when people recycle individually, without belonging to any organized group, they are helping to strengthen society. Recycling is something that everyone can do, thus providing a universal opportunity to invest some part of one's life's energy for the benefit of others. All life is interconnected. Showing respect and concern for the well-being of others strengthens those connections, even when relationships are not individual or personal. Ecological connections also exist across space and time, as well as among people. Thus, individual acts of responsibility, respect, and compassion help strengthen both present and future society. We never do just one thing. Even the simplest of individual acts may have great impacts on the sustainability of global society.

Finally, recycling can also strengthen the economy, but not necessarily in ways that most recyclers assume. Again, recycling for purely economic reasons requires no community effort to support it – it's profitable – we don't even call it recycling. Admittedly, all recycled materials and services that are bought or sold contribute to economic activity, which is a common measure of economic strength. But is an economy really made stronger by waste and pollution, simply because they generate economic activity in the processes of reclamation and mitigation? When the economic costs of recycling activities exceed the economic benefits, the credit for pursuing such activities should be credited to society, not to the economy. Without the support of the community, such economic activities would not have occurred. Thus, it's a bit misleading to contribute such benefits of recycling to the economy.

The real economic benefits of recycling are long run, rather than short run, in nature. They will accrue as economic benefits to those of future generations, well beyond any rational economic planning horizon. Such benefits accrue indirectly as a consequence of each generation accepting responsibility to maintain the integrity of the natural and societal resources with which it has been entrusted – the ultimate sources of all economic value. Those of us of the current generation must be willing to devote a significant portion of our life's energy to regenerating the natural and social *energy*, from which all future economic productivity must come.

But why would we willingly deny our individual self-interests for the benefit of some unknown persons of future generations? We are living beings. That's why. All living things have both the natural ability and inclination to be productive while devoting a significant portion of their life's energy to conceiving and nurturing future generations. To sustain this *capacity* to be both productive and regenerative, we must have relationships with other people and the other things of nature – we are all part of the same whole. To sustain the *motivation* to be both productive and regenerative we must have a sense of purpose and meaning in our lives – we must feel that what we do matters, that we can contribute to the whole.

Why do we recycle for sustainability? It's a matter of pursuing a more enlightened concept of self-interest. Certainly, we are material beings; we need to be concerned about our individual, economic well-being. But we are also social beings. We need personal relationships with other people that are not predicated on economic benefits. We are also ethical and moral beings. We

are a part of some higher order of things that transcends space and time. We owe a debt to the past that can only be repaid to the future, and our lives are made better with each payment.

We recycle for sustainability because we realize it is not a sacrifice to care about other people or to care about the earth, because these things make our lives better. When we pursue our individual self-interest at the expense of others, including those of future generations, our lives are not made better but worse. We recycle for sustainability not because it contributes to our economic wealth, but because it contributes to our happiness and well-being. In our pursuit of happiness and a better way of life, we willingly choose to recycle for sustainability.