

Symbolism of Sustainability: Means of Operationalizing the Concept

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Abstract

The idea of sustainability permeates global society and is a dynamic process enabling people to realize their potential, meet their needs, and improve their quality of life in ways that simultaneously protect and enhance earth's systems. But, to promote society-wide sense of sustainability, we must be in touch with the basic truths forming the foundation for a sustainable future. Scholars and practitioners articulate and promote their own definitions; yet a clear, fixed, and immutable meaning remains elusive. Critics believe that present perspectives offer no substance for those wanting to operationalize or implement actions. What is lacking is a way to re-integrate traditional reductionist and linearized approach to problem-solving which worked when the system was not constrained against resource and population limits. In contrast, sustainability planning and action represents a multi dimensional way to achieve recovery and improve quality of life. Besides the expression of community or corporate intent to become more sustainable, development of a systemic approach is required. A diagrammatic model illustrating the concept of sustainability can offer an improved understanding of the process of sustainable development. The acceptance and continual use of a visual tool as a conceptual framework, helps apply systemic thinking and action throughout the analysis of problems and solutions toward sustainable design processes. A holistic approach, informed by sustainability symbolism, is crucial to developing new methods of analysis and decision-making.

Key words: sustainability, system's thinking, operationalizing sustainable development, sustainability images

Introduction

The concept of sustainable development has truly arrived. The idea of sustainability permeates the global society, seeming to be embraced and promoted by governments, marketing programs, communities, educational institutions, and scientists, to name a few. But is the thinking associated with the suggestion that concepts of sustainability can guide our daily lives accurate and on mark, or just another wave in the sea of change associated with trying to solve our long-term, global problems that is popular to surf at the moment?

The call for sustainability is being fueled by for example food, fresh water, and energy shortages which are sparking social tension and global conflict (1). Pollution problems persist. Garbage is accumulating. Deforestation, soil loss, and habitat destruction are extensive. Rates of species extinction are up, wetlands continue to disappear, and global fish stocks are declining (2). Environment-related health problems account for many of the illnesses in the world today. Roughly half the world's population lives in poverty (3). The global climate appears to be changing

because of anthropogenic emissions of greenhouse gases (4). It has become abundantly clear and non-deniable to even skeptics that glaciers around the globe are melting at unexpected rates (e.g., the Arctic, Greenland, Peru, etc.). There are equally troubling data indicating decrease in annual snow packs in the mountains of the U.S., and associated loss of fresh water supplies that require something more than business as usual. No one of these problems can be called the single most important, because any of these if not addressed can do us grave harm, and they all interact with each other (5). Therefore, even if we solved all but one of these problems we would still be in trouble from whichever went unsolved.

The foundation for most of these problems is human economic demand. The totality of the human economy is measured by throughput; thus the continuous call for increased consumerism: calculated as the total number of people multiplied by their consumption of resources and waste production. There is considerable evidence now, however, that the use of natural capital by many parts of our economy, in the process of throughput, has exceeded the regenerative and absorptive capacity of the environ-

ment (6); society's collective demand on resources is nearing the productive capacity level of the Earth. The problem of climate change and global warming are commonly reported examples. These issues provide evidence that we have exceeded the capacity of the atmosphere to absorb our carbon dioxide, methane, and nitrogen oxide wastes. The declining state of many ocean fisheries is another genuine example of our world's limitations.

There are no limits to growth in wisdom and other forms of human development, but there are physical limits to growth in the consumption of resources, and to how much waste can be dumped into the biosphere. These impacts continue to grow because of our increasing numbers, growing technologies, affluence (7,8), and not understanding the "big picture." Social and economic disparities among the expanding global population are also wide and growing, resulting in more international conflict among the "haves" and "have-nots". Much about our current situation is clearly unsustainable, with dire consequences for our way of life if not addressed (1). And the implications for future generations are sobering.

The Irrefutable Need for Sustainability

Sustainable development touches the places we work and that support our economy, the natural recreational pleasures we enjoy, the places we live (both rural and urban), and the natural resources that support all life on Earth (Figure 1). Sustainable development is a dynamic process which enables all people to realize their potential, meet their needs, and improve their quality of life in ways that simultaneously protect and enhance the Earth's life-support systems. These, however, are the main poles of tension. Social inequity- material disparity in terms of needs not being met- as well as the question of why consideration for nature should come before the welfare of humans, are at the center of the sustainability debate (2). Ecological responsibility is the simple part of the concept. While there is considerable dispute over exact limits, there is general consensus that we must learn to live together within the means of nature. Socio-economic responsibility, however, is a more difficult and potentially contentious concept. Mainstream economists do not worry about shortages of natural resources to supply our



Figure 1. A concept of sustainability can be characterized by the collage of images that illustrate where humans live, what represents their economy, and the importance of nature in and of itself as well as the services it provides.

needs and receive our wastes because classical economic theory assumes that human resources can substitute for natural resources (9).

To promote a sense of sustainability in the majority of the world's population, we must go back to the fundamental, non-refutable basis of why there is a crisis in today's world. The many examples of stressed natural resources and unstable human societies are seen by most as doomsday fears that are unfounded because of myths that have become identified as truths.

To overcome this preferred view, any conversation on sustainability must be in touch with the genuine basic truths that form the foundation for a sustainable future (10), i.e.-those facts that ground discussion to the roots of the problem. It is important that the public at-large recognize these facts as truths supported by our understanding of science. These basic truths must be presented in a calm and emphatic way so that logic can prevail over pre-conceived opinions and belief systems that are mostly false, but often easier to live with. We must discover ways of making the following fundamental (basic) truths about sustainability a meaningful part of public conversation.

1. Everything material on Earth has limitations (6,11).
2. All human concerns in our global society are interconnected (7).
3. Change is the norm, not the exception (12,13).
4. All socio-economic factors are grounded in a healthy environment imperative (directionality) - environment is the plumbing of the planet (6,14).
5. Diversity within systems (natural or human) will contribute to the system's stability and resiliency (includes ecologic, economic, and socio-cultural diversity) (15,16,17).
6. Equity is the foundation of healthy functioning systems. Fairness should exist for all people with regards to both intra-generational and inter-generational equality (18,19,20).
7. Uncertainty is often associated with complex systems (7.21).
8. Society needs better systems of accounting and better means of communicating for measures to inform whether things are getting better or worse and whether we are achieving our sustainability goals (14).

A Simple but Powerful Characterization of Sustainability

The concept of sustainable development has evolved from a series of international meetings beginning with the United Nations World Commission on Environment and Development (WCED), also known as the Brundtland Commission (22). This discussion highlighted two very important issues that have become the basis of a call for sustainable development on a global level: (a) much of the world is in poverty, and development is needed to meet basic human needs, although this needs to differ from previous strategies; and (b) wealthy nations must find a way of engaging development that is decoupled from growing natural resource depletion and environmental degradation. The 1992 Earth Summit in Rio de Janeiro (more accurately known as the United Nations Conference on Environment and Development) brought the issues to international prominence and produced the worldwide action plan, Agenda 21 (23). Further attention was generated by various national councils aimed at implementing the plan and by a five year review of Earth Summit progress (24).

The Brundtland Commission concept of sustainable development "...that meets the needs of the present without compromising the ability of future generations to meet their own needs" (22) is surely the standard definition when judged by its widespread use and frequency of citation (25). One of the successes of sustainable development has been its ability to serve as a way for the convening of dialogue between those who are principally concerned with nature and environment, those who value economic development, and those who are dedicated to improving the human condition. Numerous interpretations of this concept have been promoted in the last two decades, but all generally share a number of basic principles including:

- concern for the well being of future generations;
- awareness of the multi-dimensional impacts of any decision (broadly categorized as economic, environmental, social) and,
- the need for balance among the different dimensions across sectors, themes, and scales of place and time.

Therefore, it is generally agreed that sustainable development targets multi-sectoral consideration of ecological integrity, social equity, and economic vitality (22) in ways that ensure that our actions today do not limit the range

of environmental, social, and economic options open to future generations. The original Brundtland Commission stressed the importance of intergenerational aspects of sustainability such that the failure to protect the physical environment threatens the future as well as compromises the present. It is also becoming clear that problems humans face today in the environment, society, and economy are interrelated and global in context. Sustainable economic development must be both environmentally sound and shared fairly among all societal members. Failure to meet this objective is to open the doors of conflict. Therefore, members of a sustainable community must realize that long term economic prosperity depends upon having a sound ecosystem, a healthy social environment, and a political system that facilitates full public involvement in governance.

From a general public perspective, sustainability is anthropocentric, with a sharp focus on defining and meeting human needs. It can also be approached from an ecocentric point of view, where ecosystem health is a primary concern, but in either case, the central goal is to sustain conditions and circumstances that foster the well-being of our species. The trick is to fully acknowledge that the socio-economic health of humans will always be directly linked to the ecosystems in which they are a part, not separate from or as viewed from the outside; sometimes referred to as the “directionality” of sustainability. Thus, sustainable development can mean working to improve humans’ productive power without damaging or undermining society or the environment. That is, progressive socio-economic betterment without growing beyond ecological carrying capacity, so as to achieve human well being without exceeding the Earth’s twin capacities for natural resource regeneration and waste absorption (8). Sustainable development not only implies wisdom and stewardship in environmental management to meet future needs, but also includes the equitable fulfillment of basic human needs now, such as food, shelter, clothing, and the economic means to achieve these. This view translates into an acceptable quality of life for everyone.

Since the Brundtland Commission first defined sustainable development, dozens, if not hundreds, of scholars and practitioners have articulated and promoted their own alternative definition; yet a clear, fixed, and immutable meaning remains elusive (24). This has led some observers to call sustainable development an oxymoron: fundamentally contradictory and irreconcilable (21). Additionally, critics believe that present perspectives on sustainable

development offer no substance for those really wanting to operationalize or implement actions that are believed to be sustainable (26). The meaning is unclear regarding the costs, benefits, and strategies of intergenerational sacrifice and transfers (27). It also seriously brings into question what the idea of needs really means, as stated by the WCED (22). How do we distinguish between essential needs today and wants – those that are supplementary or excessive? How do we distinguish between the needs of very different cultures? Basic human needs have been defined by Manfred Max Neef (28,29) an economist from Chile. But how do we even begin to know what the needs of future generations will be? Our deliberations can only recognize that people do inevitably require what qualifies as the meeting of needs adequate for a respectable life (7). As Norton (21) states, the consideration of needs for future generations can realistically only go as far as maximizing their opportunities while minimizing their constraints by what we do in the present – the concept of limitations imposed by the state of technology and social organization we choose to impose on the environment’s ability to meet “needs” (6). It means keeping the consumption of renewable natural resources within the limits of their replenishment; living on the Earth’s income rather than eroding its natural capital (30). And herein lays another problem: how often are we absolutely confident with regards to the limits of a resource?

If we cannot forecast our future, then we cannot back cast from that future to determine what we should do now to prepare. We need some practical, pragmatic definitions to define what sustainability means to us now. Bryan Norton (21) suggests that we should provide the opportunity for communities of stakeholders (or other groups such as corporations), to first identify the values they hold in common, and articulate how those values determine their vision for the future. With this baseline established and specific to the group of people involved there should be no concern about having to accept a definition of sustainability stated by somebody or from someplace else. Then the community or group of stakeholders can use their values and vision as a lens to begin discussing and evaluating strategic actions they want to take to improve their situation and become more sustainable. In this way actions can be evaluated with consideration for their outcomes to not lessen the opportunities of people living in the future from what the community or group has now. Living sustainably is maintaining the important mix of options and opportunities, while creating no new and onerous constraints; living unsustainably is losing them, narrow-

ing the range of options that people in other places or subsequent generations can choose among in their attempt to adapt, survive, and prosper (21).

The continuous challenge to overcome in effectively applying the complex issue of sustainable development is considering that while we may have equal or better economic opportunities than our ancestors, do we have more social and environmental benefits or opportunities in today's world? Sustainable development involves the carrying out of activities that offer economic benefits in the present without negatively affecting social and environmental choices that are available to people in the future, (or in other places).

What Makes it so Difficult?

Many having to work in the context of sustainability feel that it is too difficult to keep up with the diversification of information, and too complicated to have any real meaning to either professionals or people in the general populous, by there not being a simple, tangible foundation upon which to guide decision-making. For example, there are a number of different resources related to defining and thinking about sustainability, such as: *Silent Spring* (Rachel Carson); *The Limits to Growth* (Club of Rome); the Brundtland Commission/Our Common Future; the United Nations Environment Program Millennium Development Goals. Likewise, there are several broad frameworks that promote concepts of sustainability, including: The Natural Step; The Triple Bottom Line; the Earth Charter; the ICLEI - Local Governments for Sustainability and their Mayors' Council on Climate Change with its Climate Protection Agreement. As well, there are a number of different principles and practices that have evolved in recent years as we learn more about the diversity of issues surrounding a more sustainable future, such as: the Precautionary Principle; the Hannover Principles; the Melbourne Principles; Ecological Footprinting; Environmental Management Systems (EMS) - ISO 14001; Industrial Ecology; Leadership in Energy and Environmental Design (LEED); the Sustainable Forestry Initiative (SFI); Life Cycle Analysis (LCA); etc.

Atop of this information, there are several reasons why thinking and acting in the context of what sustainability suggests does not necessarily come naturally. The image comes to mind where depending on how you adjust your focus you can see either a beautiful woman or a wicked witch. But you cannot see both at the same time. The

brain allows us to process one image at a time. Therefore, it is equally likely that our brains are more comfortable just thinking about one sector at a time, like economics *or* ecology. But the application of sustainability means that we must exert greater effort in making decisions by ensuring that we fully exercise our capacity to see different views of a situation, not just the one that seems most obvious. The difference is that single-minded approaches to complex problems can offer insight, but a single approach is dangerously incomplete. In contrast, better ideas and policy can be produced through a process of multi-angulation in which a problem is analyzed from a number of different perspectives.

Another real problem with accepting the implications of sustainability also relates to the way the human brain functions. Andrew Ferguson (31) suggests in "The Roots of Delusion" that the brain might possess pathways that operate in a manner to inhibit logical faculties when a topic of discussion is one on which a person has a preconceived opinion, or the discussion subject goes against one's belief system, such as having to experience sacrifice. If this is in any way rooted in brain function, then when any average person is presented with facts about climate change, water shortages, natural resource declines, affects of population on global stability, pollution, energy problems, etc., there is ample reason to assume that active inhibition of logic might involve a favoring of heavily invested opinions and belief systems. This can arise from a feeling of self-preservation, implying that these issues are "somebody else's problem, not mine." The possibility that human logic can be affected in this way does not bode well for sustainability specialists to convince the populace at large that our global situation has problems and requires solutions that go beyond our traditional, sectoral approach.

Piecemeal Versus Systems' Thinking

How do we move beyond the rhetoric of sustainability while also establishing or maintaining a "big picture" approach to problem-solving? Without acceptance of a common philosophy related to what sustainability represents, neither the general public nor scientists with significant expertise share a universal model for understanding and addressing issues. It is this lack of a shared conceptual model that prevents communication among segments of society and encourages disciplinary experts to "talk past" their counterparts from different disciplines (21). The absence of a shared understanding sets the stage for ideo-

logical thinking to dominate because there is no flexibility for testing reality. The lack of flexibility in discussion of sustainability often allows dogma to influence the debate, and leaves no room for learning from the experience of others or from testing certain ways of proceeding, as in adaptive management approaches. This lack of a universal, holistic approach has a long history.

Traditional problem-solving, especially as it relates to the environment, has usually relied upon a piecemeal approach to addressing major issues of concern. In some cases addressing these issues has represented conflict (e.g., jobs versus the environment). The traditional approach attempts to isolate the particular concern, which will often be related more to a symptom of the problem rather than its root cause. Developing a resolution to the situation most often ignores potential interconnections

and feedback effects to other sectors also influenced by the initial problem (as conceptualized in Figure 2a). Fragmentation, in the form of specialization, and the resulting myopia in major sectors are key obstacles for creating a sustainable world. Each individual, group, business, non-profit, community, or country sees its own challenges as being the primary problem with little comprehension or capacity for consideration of other issues, and hence the inability to effectively deal with other problems. Many believe that if only their problem is solved and other solutions are subordinated to this solution, the systemic problem will solve itself.

What is lacking is a way of re-integrating everyone from a reductionist and linearized approach, which worked very successfully when the system was not constrained against its resource and population limits, as it provided a very ef-

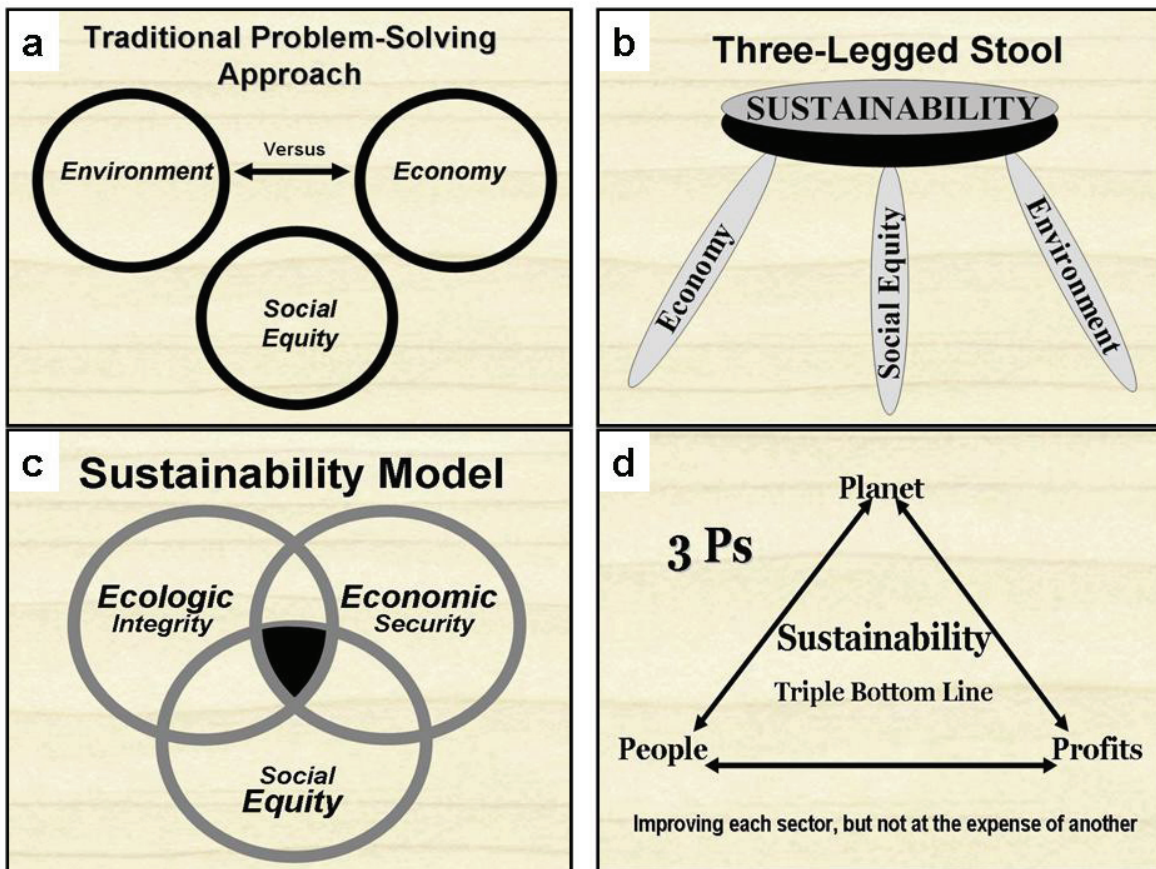


Figure 2. As opposed to (a) the traditional approach to decision-making and problem-solving, sustainability can be symbolized by the (b) idea of a 3-legged stool that suggests each sector needs to be equally considered in decision-making, (c) the 3-overlapping circles that further advocate the idea of simultaneous improvement in each element that comprises sustainability, and (d) the Triple Bottom Line that promotes the idea of meeting corporate social responsibility in the conduct of business by also addressing issues of people and planet

fective way of leveraging ideas with few degrees of freedom. The lack of acknowledging interconnections and the removal of feedback loops due to linearization poses an additional problem in that it increases efficiency. Ordinarily an increase in efficiency would not be considered a problem but rather a tangible benefit as fewer inputs, in the form of resources, would be needed. However, society has chosen to leverage this efficiency to produce more, rather than use less, and this has created additional problems (32). By leveraging efficiency, side-effects have an impact on the system. The results are unintended, unpredictable, and chaotic. This scenario was most recently observed in the implosion of the U.S. financial system.

In addition, numerous practitioners, wanting to solve problems more immediately, believe that “the big picture view” of sustainability is not specific enough for the problems encountered on a daily basis. Instead, they feel the need for guidance that is more narrowly focused and target-oriented on their particular environmental, economic, or social concern (i.e.- the quick fix). In many situations the lack of balance in addressing the integration of environmental, social, and economic dimensions in planning and action leads to the interpretation of sustainability as being mainly about environment and conservation issues, often falsely opening the door to greenwashing. Rather than following the reductionist method of scientific inquiry — breaking complex problems down into small parts for study — researchers are being asked to examine the very broad connections between those parts. For example, a scientist exploring new pest-control methods would have to determine not just how to eradicate or control the pest, but also how to do so without harming the environment, compromising the farm’s economic stability, or endangering the health and welfare of the community.

As individuals and communities we can move towards sustainability when we recognize that everything of concern to us is somehow connected, and purposely consider these multi-dimensional *connections* in our lives when faced with making *choices* so that unintended *consequences* from our actions (42) do not undermine future environmental, social, or economic well-being (the 3 Cs of sustainability). Sound economic development, equal social access and benefits, and environmental health are inextricably linked. Therefore, choices we make must simultaneously advance objectives in these different sectors. Our choices (solutions) should be sensitive to system parts and their interconnections, the complexities of a problem, and the consequences of making a change with-

in the system. This is most often referred to as systems’ thinking, a holistic approach to analysis that focuses on the way a system’s constituent parts interrelate and how systems work over time and within the context of larger systems. This approach, which can be enhanced by a true visualization of the system through images or symbols, contrasts with traditional analysis, which studies systems by breaking them down into their separate elements.

A Picture is Worth a Thousand Words

Sustainable development requires the participation of diverse stakeholders and perspectives, with the ideal of reconciling different and sometimes opposing values and goals toward a new synthesis and subsequent coordination of mutual action to achieve multiple values simultaneously and even synergistically (25). Sustainability represents a multi dimensional way to achieve recovery and improve the quality of life for everyone. It can achieve these ends by concurrently limiting waste and pollution in the environment, improving the social equity of disadvantaged peoples, conserving natural resources, making valuable connections among people, promoting cooperation and efficiency, and developing local assets to revitalize the economy. Simply acknowledging this cross-sectoral aspect of sustainability, however, does not necessarily guarantee that those wanting to be more sustainable in planning, decisions, policy, and actions will achieve their goals. Besides the expression of intent of a community or corporation to become more sustainable, there needs to be development of a mindset that will embrace the systemic approach that leads to successful outcomes in sustainability plans and actions. The quality of human life in the future is about the choices we make. For our choices and actions to be sustainable, they must be elastic, adaptable, and creative. Despite planning, there is always an element of discovery; biophysical research and ecosystem science have demonstrated the interdependent functions in nature, as well as between nature and humans, and recognition of these interconnections is important to preventing harm from our actions (16,21) and promoting a sustainable future.

There generally seems to be a lack of clarity in communicating what is truly meant by sustainable development. For every person has an understanding of some meaning of sustainability, there are probably ten times as many who do not, either because they are confused by the ideas embraced in its theory, or they just don’t trust its concepts (2). Unfortunately, this plethora of views and con-

cerns has nearly rendered the term meaningless and has distracted from the need to address the multi-dimensional nature of economic, social, and environmental issues in our world today (34). An excellent indicator of this lack of systemic understanding becomes apparent when one refers to “environmental sustainability.” Sustainability is not characterized by adjectives like environmental, social, or economic, because these concepts are embedded in its essence- the simultaneous consideration of these kinds of issues in problem-solving and strategic action that are truly sustainable. Reference to one of these adjectives suggests an incapacity to grasp the (multi-dimensional) nature of sustainability thinking and action.

Therefore, trying to *operationalize* the concept of sustainability often is met with confusion about what the idea promotes. Numerous challenges exist in understanding how the practice of sustainable development, in contrast to traditional linear approaches to decision-making, could be helpful in evaluating policy choices or business decisions. Planners, policy-makers, managers, and even the average consumer need more than technical competency: they need to take a more holistic approach to problem solving, create new systems, inspire others to change, and better communicate among themselves and the public in general. An approach to understanding and thinking in a sustainability context needs to move into the mainstream with regards to how integrative thinking can break down the notion of intellectual silos, generate new solutions, and promote greater ownership of the challenges. This shift in perspective can be the difference between a system in which one adds a device to lessen the pollution emission at the end of a pipe, to one in which the need for the pollution abatement device is eliminated altogether.

So how do we overcome traditional, fragmented approaches to promoting sustainability, so as to reach beyond the obstacles related to the capacity of the human mind to “see” more than one subject at a time and our abilities to overcome pre-conceived notions regarding certain subjects. Is it possible that a picture is truly worth a thousand words? Do the symbols of a conceptual framework describing the concept of sustainability offer an easier way to describe and act in ways that require simultaneous consideration of multiple factors in order to better inform decisions or choices? In Figure 2b sustainability is represented as a 3-legged stool; in order for the stool to remain standing all three legs must be involved in supporting its seat. All three sectors need to be considered in sustainability discussions to advance and strength-

en the interdependent and mutually reinforcing pillars of sustainable development- economic development, social development and environmental protection.

Historically, many have viewed the foundation of sustainable development, as represented by the 3-overlapping circle model of sustainability, or the triangle characterizing the Triple Bottom Line or TBL (Figures 2c and 2d). The three sectors, in the ways exhibited by each image, differently imply interaction with each other, so that we cannot make decisions, make policy, manufacture, consume, or essentially do anything without considering the effects and costs upon all three at the same time. The idea of simultaneous consideration promoted by these images helps to overcome a focus solely on economic concerns, with ecological or social benefits sometimes considered as an afterthought. Instead, fully addressing issues of sustainability is a concurrent act complementing competing interests to the advantage of all sectors.

A diagrammatic model or picture that illustrates the concept of sustainability can offer a means to more easily acquire a way of understanding the process of sustainable development naturally, automatically, or without conscious thought by the process of developing a second nature to the way we think about and do things. The idea of *second nature* refers to an acquired behavior or trait that is so long practiced so as to seem innate(35). The acceptance and continual use of a visual tool, as a conceptual framework to convey symbols describing what we are trying to consider, helps to apply systemic thinking and action throughout the analysis of problems and solutions toward sustainable development and design.

The insights offered by a more in-depth and dedicated discussion of sustainability symbolism turns the notion of “balance” of issues of concern on its head: sustainability, rather than balancing economy, ecology and equity, can employ their dynamic interplay to generate resiliency and value to programs and projects. Consider for example that the 3-overlapping circle symbolism (Figure 2c) strikes at the core of sustainability by demanding equal consideration of all sectoral issues in their entirety rather than simply striking the best balance one can achieve among the sectors. Each decision toward problem-solving or for improvement has an impact on all three. In contrast, holding one of these concerns as an ultimate goal often puts economy, ecology and equity at cross-purposes. The shaded area in the middle (Figure 2c) indicates where the focus of each separate circle (issue or concern) integrates.

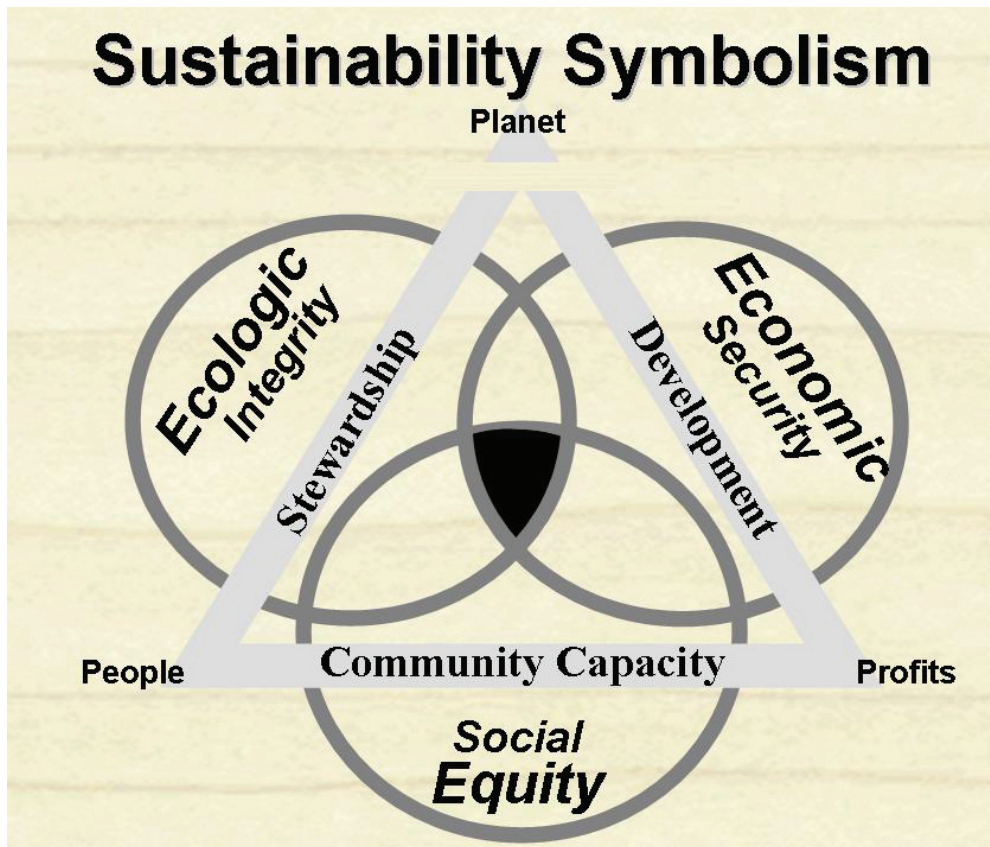


Figure 3. Integration of the TBL triangle with the symbolism of the 3-overlapping circles is a powerful way to evaluate the systemic concept of sustainable development through the definition of numerous benefits derived from thinking and acting in a multi-sectoral fashion.

When put together, the common root of a problem's economic, social, and environmental concerns can be found and the various issues integrated in a holistic, sustainable approach to solving the problem. Once the overlap is identified, acknowledged, and accepted, people can begin working collectively, extending the area of overlap and integration. Although the overlap might be minimal at first, it is a beginning, with the increased fusion of traditionally perceived areas of potential difference or conflict.

Even greater information can be conveyed by the 3-overlapping circles overlain by the triangle signifying the TBL (Figure 3). In considering the 3-overlapping circle conceptual framework and its implied meanings for sustainability thinking and acting, the 3 Ps triangle signifying the TBL can further inform what the circles imply about sustainable planning and action.

If communities are focused on developing a more sustainable economy and doing it in ways that seek equal consideration for modern society, economics, and nature (the

three overlapping circle model), then stakeholders will be guided by the community development triangle (overlaying the 3 circles in Figure 3). According to this representation, the *development* of economic security for a place requires consideration of equal opportunities for all (the rising tide), diversity of economic structure, and environmentally sound production design to minimize economic leakage through the development of value-added processes and promotion of local consumption (Figure 3). The triangle also suggests an image of closely linked elements of *stewardship* to enhance a locale's ecology, natural resources, ecosystem services, and people (Figure 3). Furthermore, in order to achieve sound support mechanisms between development and stewardship, there must be a healthy foundation of *community capacity* upon which to enact identified actions, inclusive of strong leadership, full public involvement (civic critical mass), and collaborative decision-making and action (Figure 3). Achieving sustainability involves connecting the sides of the triangle (2). This image of the 3-overlapping circles and the TBL triangle includes an "unfinished" portion - a symbolic re-

minder that society's ascent to its full human potential is always a work in progress (Figure 3).

Equally informative is the concept presented by the hierarchy of circles shown in Figure 4, which suggests the importance of being cognizant of "directionality" in discussing and deciding on sustainability issues. In many cases, discussions of sustainability initially focus on the environment. This is not to say that social well-being and economic prosperity are less important. Rather, it demonstrates the directionality of sustainability issues as influenced by the laws of nature. In evaluating Figure 4, consider the following scenario from Peter Senge (36) to illustrate the idea of directionality in sustainable development:

- The industrial/product manufacturing system – our economy – what we make, buy, and use (from cars and TVs to buildings and power plants) – sits within the larger systems of environment – nature.

- This larger natural world includes living, regenerative resources, such as forests, croplands, and fisheries, and other resources that, from a human time perspective, do not regenerate, such as oil and minerals.
- The regenerative resources can sustain human activities indefinitely, so long as we do not "harvest" them more rapidly than they replenish themselves.
- The non-regenerative resources can only be depleted or "extracted." That is why mining, oil production, and other similar industries are called "extractive industries." And yet surprisingly, since they cannot be replenished, sooner or later — as is happening right now — many start to run out.
- In the process of extracting and harvesting resources in order to produce and use goods, our economy (industrial system), also generates waste – waste from extracting and harvesting resources and from how we produce, use, and eventually discard goods. This waste damages the ability of nature to replenish resources.
- The economy and our industrial system also sit within a larger social system of communities, families, schools, and culture. Just as overproduction and waste damage natural systems, they also cause anxiety, inequity, and stresses in our societies.

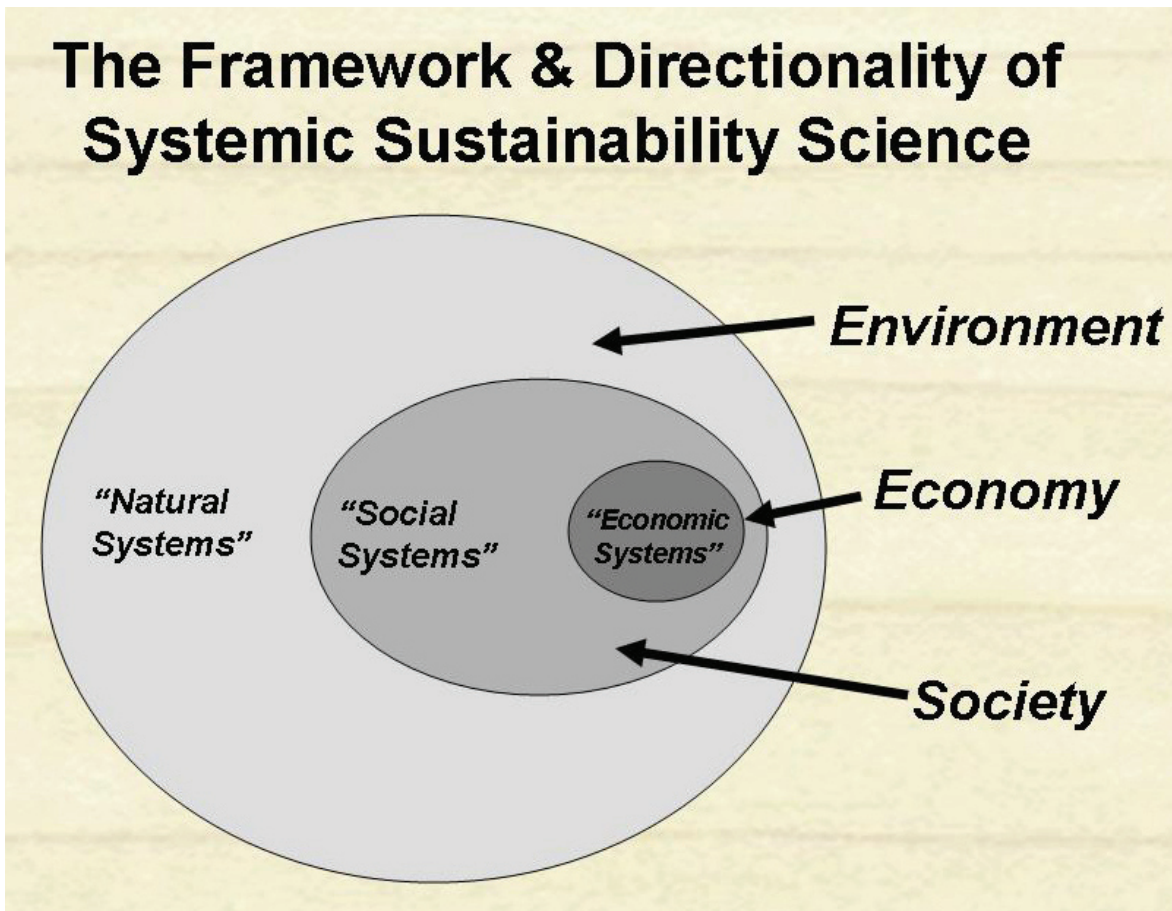


Figure 4. The directionality of sustainable development is demonstrated by the overall hierarchical relationships among the three major systems encompassed by the concept of sustainability.

This diagram (Figure 4) uses set theory concepts to display the overall relationships among the three major systems, as encompassed by the idea of sustainability. Economics is controlled by social forces which in turn are constrained by the ecosystem, which is bounded by physical parameters. The Biosphere includes all living things on Earth and the non-living systems with which they interact and on which they depend. The Social System is within the Biosphere and includes all the human elements of the Biosphere. Natural Systems are thus the non-human elements of the Biosphere. The inner systems influence the outer systems, but the controls are greater going inward. In addition, human society is part of the ecosystem and is not something that exists outside of its boundaries (humans are *a part of nature*, not *apart* from nature). In acting under the principles of sustainable development, our economic desires/demands become accountable to an ecological imperative to protect the ecosphere, and a social equity imperative to create equal access to resources and minimize human suffering.

The final image presented (Figure 5) builds upon others already discussed and allows visualization, in the form of

symbols of a process of full sustainability analysis in the evaluation of issues and problems. Symbolism of where we are presently on a global stage in considering issues of sustainability can be quite informative if we include the ever-present idea of technology “saving the day” in moving toward future conditions. This indicates that even the best technologies will not put society on a sustainable course without a fundamental shift in our understanding of how these technologies and their intended outcomes are related to the 3 sustainability sectors. Figure 5 shows a conceptual representation of how technology serves a central influence on our consideration of the 3 E’s and how decision-making guided by sound inquiry in the socio-economic well-being circles can control the use of this technology toward a more resilient future.

Conclusion

As sustainability concepts begin to take hold, the triad of concerns - economic development, social equity, and environmental protection - which were once considered an impractical, blue-sky ethic, have begun to define both long-term strategy and everyday practice of sustainable

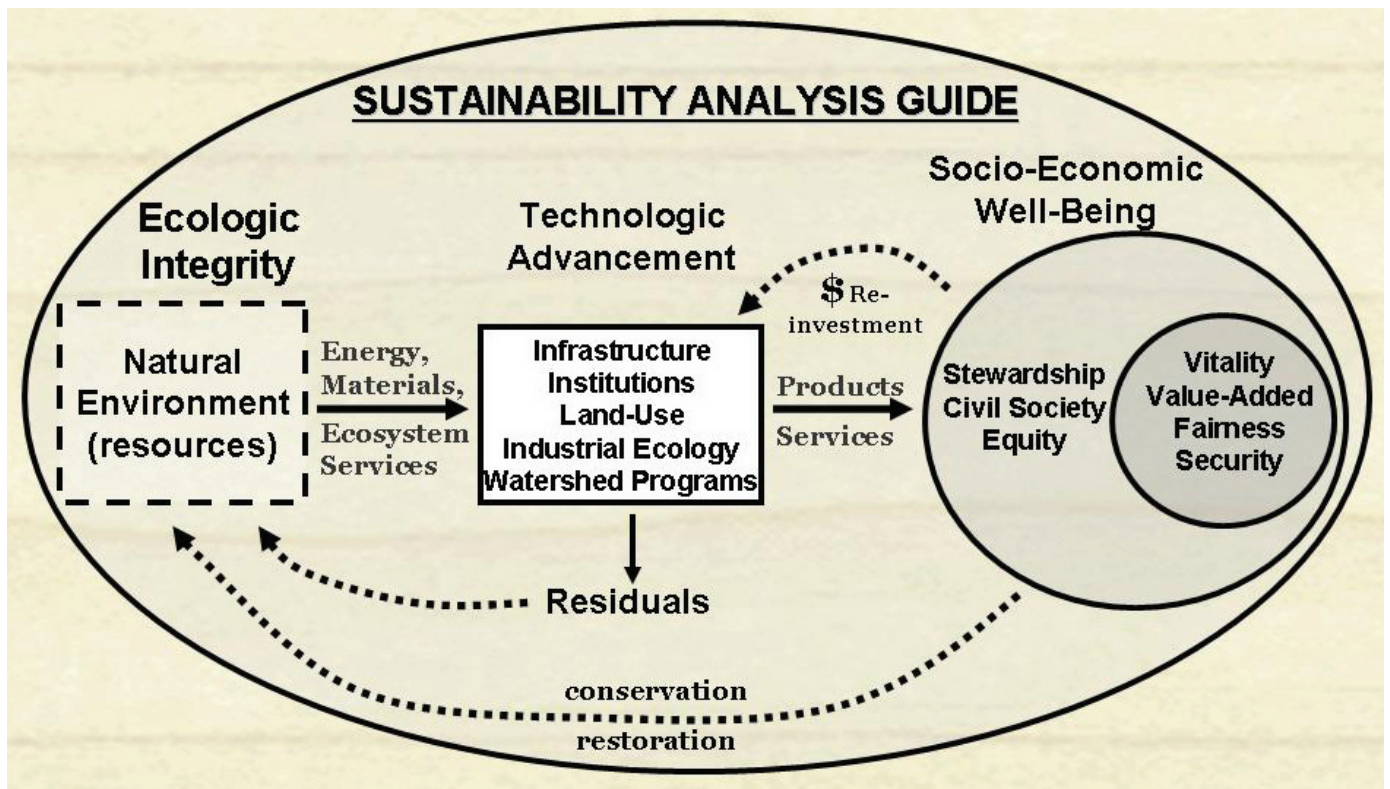


Figure 5. The symbolism shown here provides a thought process and guide to sustainability analysis in reference to the application of technology as a means to utilize natural resources for socio-economic well-being. Numerous feedback paths suggested by this symbolism are the source of sustainable actions for human improvement.

development and decision-making. Symbolism can be effective in helping the general populous to better understand why the overriding economic priority in our society is not profit and growth, but rather people and planet. The effective reminders afforded by symbolism can reinforce persons' second nature in embracing the ways we can move from a consumer society to a conserver society, from mere product greening to actual downshifting, and from "always more" to "enough".

Sustainability is as much a construct in the social sciences as the natural sciences. In recognition of this intended multi-sector approach, TBL has become popular, especially in economics and business, with regards to symbolizing how to operationalize sustainability, emphasizing the need to simultaneously consider and problem-solve for economic, social, and ecological goals. There is an immediate need for a system-wide integration of the different sectors of the environment as well as the different sectors of humanity when solving system-wide problems. The era of the specialist is over and the era of the generalist has begun. The methods of yesterday's solutions are what caused the problems of today. We must be sure that they do not cause the problems of tomorrow as well. A holistic approach, better informed by the sustainability symbolism described here, is crucial to developing new methods of analysis and decision-making.

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Competing Interest

The author declares that he has no competing interests.

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