HIERARCHICAL LEVELS FOR SUSTAINABLE DEVELOPMENT PRINCIPLES

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Summary

Most readers will conventionally understand hierarchy as a chain of command, or vertically conceived structure, common among old-style Weberian models. However, to account for changing social, political and environmental circumstances, a different concept of hierarchy must be used. Among systems scientists, hierarchy is a set of interrelating systems within systems and their interactive simultaneous relationships at varying levels of complexity, or hierarchy. If humankind is to confront the challenges to a sustainable future, it appears necessary to adopt this perspective, or hierarchical framework, for the sustainable development principles and their associated psychological obstacles discussed in this theme-level article, so that the hazards of the twenty-first century may be made the best of or survived.

1. Introduction

Inadequate response to challenges of the environment and to ourselves is now attributed to differences and divisions among and within the apparently intelligent hominid. The direct and indirect impact of human actions on the natural environment, and the distraction and division among people over cultural, economic and other political priorities—together with an undue reliance on technology as a panacea—have put national policies for long-term sustainability in conflict with options for the satisfaction of a growing number of short-term human needs—perceived or real. Should sustainability be a rational goal, qualitative and behavioral change is no longer an option, it is a necessity for the quality of life on Earth and its long-term continuity.

M.I.T. systems scientist Forrester (1973) argued, and this article holds, that in order for policy and action to be aligned with reality and for sustainability to occur, humans should strive to achieve three things: "(1) the best existing (mental and scientific) model should be identified at each point in time; (2) the best currently existing model should be used in preference to traditional models that may be less clear and less correct; and (3) aggressive effort should be devoted to a continual improvement in the available models." While no single model will ever be able to integrate the entirety of experience for all humans, the model offered here is intended to provide, as adequately as possible, a template that may be continually improved upon so that humankind may make the best of the twenty-first century.

The British economist Keynes was quoted by Walker and Soltis (1997) as saying "There's nothing as practical as a good theory." To optimize the human experience therefore requires the continual development of new theories, and acknowledgement of how the complex and dynamic world system works at any given point in time. This includes, as the preceding article (see Chapter *Principles of Sustainable Development*) holds, "unlearning certain beliefs that are demonstrably untrue and harmful in their consequences." Modern beliefs and mental models are derived from perceptions of reality that have developed over centuries, and may or may not correspond to the present-day observable reality.

This article does not, and cannot, attempt to judge whether these particular beliefs and models are "right" or "wrong." Rather, it holds that adequate beliefs and models are considered practicable beliefs and models that enable human survival on the Earth, regardless of how that survival may be explained. Humankind encounters trouble when erroneous or outdated mental imagery that drives behavior is confused with actual reality (similar to a type II error in statistics and econometrics). Whether certain humans are willing or able to make the necessary conceptual adjustments and short-term sacrifices that allow for sustainable, pluralistic, political economies without "coercion" of the external environment, is however, questionable.

Recognizing that human thought and behavior are at the core of any sustainability initiative, Caldwell (see Chapter *Principles of Sustainable Development*), and this article, argue for the avoidance of five behaviors, and offer the following five positive statements as operative sustainable development principles:

1. A way must be found to mitigate the excessive growth of human populations.

2. The development of metadisciplinary scientific and mental frameworks must actively be sought in order to evaluate harmful or self-destructive trends, so that foreseeing or forbearing may occur.
3. Mental perspectives must be shifted away from short-term assessment of opportunity towards long-term survival.
4. Every effort must consciously and actively be made to respect natural systems, thus ensuring their long-term health and survival.
5. Technology (and its consequences) must be placed within the proper context in societies.

Correspondingly, to achieve the above behaviors, seven underlying psychological "sins" of sustainability are identified:

1. Humans must not continue to deceive themselves into thinking things that are demonstrably untrue.
2. Humans must seek to be rational, allowing for actions to correspond with observable reality.
3. Humans must be prudent when long-term interests conflict with other, short-term, goals.
4. Humans cannot let their short-term desires create a condition of single-mindedness, called myopia.
5. It must be understood that not every aspect of the human condition can be accurately measured by a monetary value; a condition termed "economism."
6. Hubris or ego cannot be allowed to compromise any one of the above patterns of thought.
7. Humans should always seek to apply compassion in ways that are directed toward improvement of the human condition.

In the end-state, the avoidance of these thoughts and behaviors would appear to encourage a redirection of the underlying assumptions and beliefs within the traditionally conceived political economy on an unsustainable trend of indeterminate linear "growth." The obsession with such underevaluated growth prohibits the right kind of improvement of the human and natural condition necessary for a sustainable society. Urgent declarations regarding the need to reverse observable and possibly destructive social and environmental trends, resulting from a prevailing myopic viewpoint, have not led to the establishment of common intergovernmental, national, and local public policy. Differences of opinion have arisen—competing power structures and priorities within and between nations, and their respective constituencies, now hinder the transition to a sustainable and homeostatic future.

In 1992, signatories of Agenda 21, for example, made unambiguous end-state commitments to make policy changes for sustainability. Yet when these commitments were (are) attempted at national levels, domestic constituencies and leaders in government were (are) hesitant or unable to make necessary priority adjustments—paralyzing otherwise rational goals reinforced by science, and even so, reiterated in the "Precautionary Principle" outlined in the Agenda.

If a preemptive strike against various unsustainable trends is to be attempted, it is necessary to establish a new shared perspective, or framework, for the behavioral principles and the psychological obstacles presented in the theme-level article in this section of the encyclopedia on sustainable development. In doing so, to the extent possible, users of this encyclopedia will, it is hoped, acquire the capability and perspective to develop their own targeted, specific, and long-term plans for the sustainable improvement of their environmental, social, and material conditions, under facilitating circumstances that governments, private individuals, organizations, and others, can—and hopefully will—provide. This article will, therefore, seek to provide politicians, laymen, managers, and practitioners, with an updated conceptual, practical, and necessary hierarchical framework for sustainable development principles that may be continually improved upon.

Recognizing limits to throw-away behavior and the satisfaction of immediate "needs" in deference to long-term necessities is requisite for the condition of sustainability. This condition can either be proactively achieved or achieved under the coercion of duress. While the necessary time may already be too short to take preferable action, as the following sections of this encyclopedia will show, there remains hope that modern society may transcend, or at least delay, the outcome of present unsustainable trends.

Historically, humans have waged battles against other people and their cultures or ideologies. Yet to achieve sustainability, the present predicament is quite different. The greatest enemy is no longer any particular external threat—the race for survival now comes from within human minds. Can these be changed fast enough?

2. A Hierarchical Model

It could be said that a primary reason for this encyclopedia is that humans are unable to understand adequately observable, but unexplained, complex, nonlinear multiloop feedback relationships in the forming of priorities, opinions and in the making of sustainable decisions. Even in the modern world—with greatly expanded levels of information, computational power, and insight into how humankind and its surroundings interact—the complexity and dynamics of the human universe are far too extensive for human measurement or comprehension. It may be possible to model certain subsystems of this universe, but perhaps—when the whole is greater than the sum of its parts—it might always be beyond human understanding.

A standard concept of hierarchy is defined by dictionaries as a pecking order, a chain of command, or a ladder of priority. In the old-style Weberian command and control bureaucracies, this would most likely have been the common conceptualization in evaluating hierarchical levels for sustainable development principles. Yet for the purposes considered here, the operative sustainable development principles and their conceptual analysis must be considered as operating simultaneously at varying levels of complexity, as each singly or together contribute to the achievement (or not) of a sustainable future. The observations following in this article, although listed under certain hierarchical levels of analysis, should therefore, apply in principle to all other levels.

To account for the necessary perceptual adjustment, a different concept of hierarchy, used among systems scientists, must be employed. In this model, systems within systems simultaneously operate as part of a hypothetical "universe," or a whole of the constituent parts. Rather than vertical relationships, hierarchy is conceived as interacting and simultaneously operating systems at varying levels of complexity, or levels of analysis (see Figure 1).

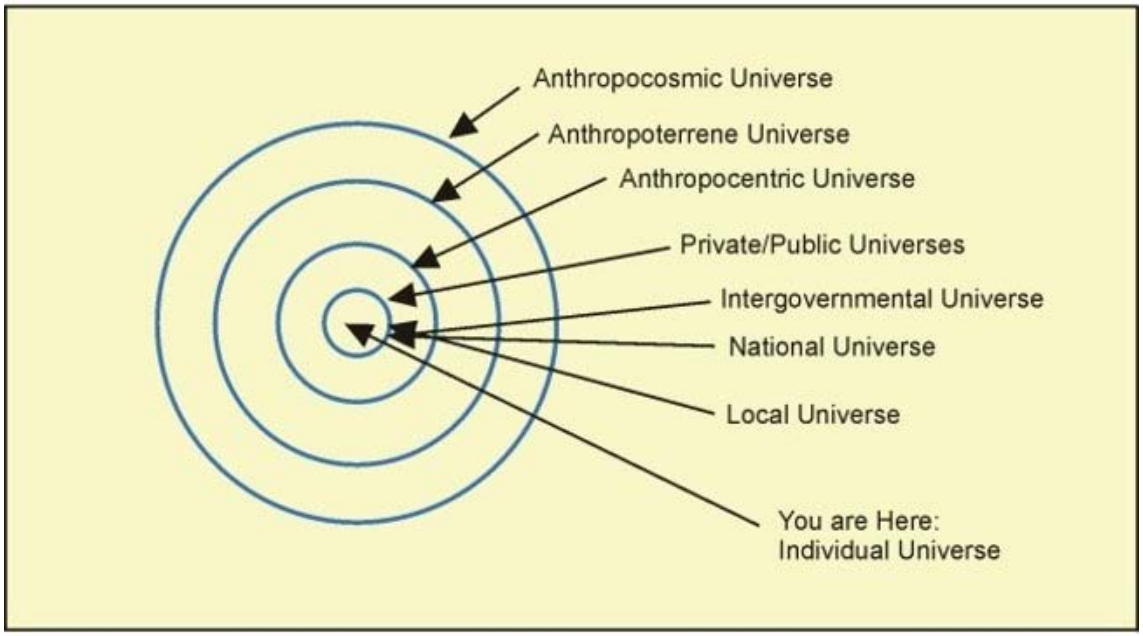

Figure 1. Hierarchical levels for sustainable development principles

To be read correctly, this model operates on a simultaneous continuum from small to large—from an inferior level of complexity (the individual universe) to a superior level of complexity (the anthropocosmic universe) and back again. All hierarchical levels of analysis interact and operate at the same time, and all affect one another in some way.

Implementation of sustainable development obviously occurs only at the anthropocentric level and within its subsystems. Its subdivisions indicated on the diagram are the sectors at which the various aspects of sustainable development occur. All of these universes, or levels of interaction, must intersect in a mutually consistent manner to achieve the goals of sustainability. And of course, with schematics, modification of this diagram is possible. However, in any diagram, the aspects of the whole must be integrated toward the goals of sustainability, although not necessarily so for other purposes.

The broadest level in this model is the anthropocosmic universe—the most complex level of existence that includes all elements of the seen and unseen human universe—stars, galaxies, dark matter and the human individual. This universe, and its complexities and relationships, are beyond human total comprehension or scientific measurement. For the purposes of this article, this perceptual limitation must be acknowledged. The anthropocosmic universe, therefore, cannot usefully be included in the analysis of sustainable development principles. Tucker and Grim (1998) showed that

different religions have different explanations of how this system works, and Greene (1999) discusses how theoretical mathematicians are attempting to understand its complexities through super string theory. Yet whichever methods of explanation or analysis, human-derived principles of sustainable development are meaningful for human society but are hardly applicable to higher levels of existential reality.

The second simultaneously operating system, more familiar and less complex than the anthropocosmic universe, is that at the planetary level—the anthropoterrene universe. This universe continues to be beyond human comprehension, as predictive modeling of the multiloop nonlinear feedback subsystems and relationships in the anthropoterrene universe are apparently outside the capability of the largest available supercomputers (and possibly the human mind). In this article, however, analysis will begin at this hierarchical level, as the Earth and all of its subsystems (e.g., animal and plant ecosystems, humans, air, water, and organic matter) are elements that enable human survival.

The third level of hierarchical analysis will transit into the less complex anthropocentric universe—that which humans can measure and interact with, yet still apparently cannot reliably control. This level of analysis includes humans and their private and public institutions, applied technologies, and all of their simultaneously operating constituent philosophical theories and assumptions. For the purposes addressed here, the anthropocentric universe includes: the private universe and its constituent issue advocacy and umbrella subsystems: the public universe with its intergovernmental, national and local subsystems (universes); and the individual universe.

Toulmin (1961) noted that traditional methods of scientific research often reduce phenomena to their most elementary level of analysis. But to understand the interactions of humans with one another and with nature, a widened concept of the complex and dynamic whole is first necessary. As noted, how these natural, gravitational and other highly complex systems may interact is beyond present understanding. However, acknowledgement of their existence and of the need to understand these "self-organizing systems" better might be considered half of the solution in the journey to a sustainable society.

Humans may be able partially to control what is perceived and partially understood. However, the more is understood, it appears that more questions than answers are being developed. In this sense, recognition of human ignorance is expanding. This recognition of the shortfall in present perceptual abilities might help toleration of the reality that different people from different cultural perspectives have their own idea of what the problems and their respective solutions may be. Also, from whichever hierarchy or cultural perspective, it will demonstrate that humans do not know what they are really doing. For every action there are reactions, perceived or not. Working from this broadened perspective, policymakers and other actors would be likely to err on the side of prudence rather than prevailing unsubstantiated optimism—disregarding the presently predicted adverse consequences of human ignorance.

According to the systems model presented here, the lines as shown in Figure 1 are not closed. Any activity at any one of the above levels of analysis could affect the other. It

appears that present-day concern with sustainable development demonstrates that the anthropocentric universe (that of the apparently intelligent hominid) is compromising the stability of the anthropoterrene universe. Because of the symbiotic relationship among all systems and their subunits, humankind is apparently compromising its ability to survive through its own traditional thoughts and behaviors.

Before moving forward, however, it is important to note that within this hierarchical model, systems at higher levels of complexity will continue to operate with or without the presence of their subsystems, but differently. For example, in terrene (geologic) time, the Earth may be expected to exist long after humans have departed. From the cosmic perspective, the universe will be likely to continue long after the anthropoterrene reality has faded into the eternity of cosmic time.

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Biographical Sketch

Jeffrey Stephen Miller is Research Associate with the School of Public and Environmental Affairs (SPEA), Indiana University, US. His interdisciplinary science and policy research centers on public affairs at local, national, and international levels. Miller has attempted to balance his public and academic life, writing for journals, participating in academic conferences, and working in politics. He seeks to use his past professional experience as a policy analyst and coordinator of human development assistance to integrate practical and theoretical knowledge for improvement in the human and natural condition. He is presently working with Lynton Caldwell on a forthcoming book.