

Systems and Sustainability

Understanding Systems and Employing a Knowledge Systems Approach to Creating a Sustainable Future

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February 20, 2014

Introduction

I am a meat eater. I savor the primal gratification of biting into a juicy steak. Recently, in my favorite coffee shop, I sat reading as patron after patron ordered sausage, egg and cheese after sausage, egg and cheese. My mouth watered with each successive request. However, a systems view made me think broadly about the impact of eating meat; challenging my desire to rush to the counter for my own repast. I considered the health risks of processed meat, especially after completing an invigorating two-mile run. I then considered the conditions under which the meat was produced: the possible poor treatment of the animals throughout their lives and at the point when each met with its demise; the water pollution from manure and meat processing wastes; the greenhouse gas emissions associated with every step in the process, from grain production, to animal methane emissions, to processing and transport; and finally, the impact on rural communities when concentrations of massive animal feeding operations dominate the landscape. Suffice it to say, I instead chose a breakfast of organic whole grain toast and fruit. After several days passed, I admit to having enjoyed a succulent corned beef on rye sandwich. However, seeing the world in systems allowed me to weigh the benefits versus the costs of eating meat products and helped me to limit consumption to the products that provide the greatest gratification. Organic free range would have been an additional step in the right direction, but try asking for that from the counterman in a crowded New York deli!

Not surprisingly, as many meat eaters are asking the same questions, the livestock industry in the United States is beginning to assess the sustainability of its operations. They are looking across entire supply chains to determine where environmental, social and animal welfare impacts occur and how they can modify their operations to minimize such impacts. From a vegetarian's perspective this may provide little solace, however, there are substantive improvements that can be made as the industry begins to understand and respond to the system constraints within which it must function. These include the availability and price of water, energy and raw materials; the evolving nature of demand and the willingness and ability of customers to purchase their products; and the legal, financial and insurance structures that set important operational perimeters.

I again pondered the notion of systems last summer as the sun beat hard on the Brooklyn pavement. Under a construction awning, domed lights blazed for no apparent reason save the laziness of the maintenance crew to switch them off at daybreak. Against the building facade stood an elderly woman with a walker, talking on a cell phone about her difficulty breathing and the need to set a doctor's appointment to find the cause and some relief. While connections between these observations may be speculative at best, a systems view of the world begs consideration. Was the sun's radiation reaching the earth just a bit greater that day because of manmade greenhouse gas emissions, in part created by the fossil fuel generator that powered those lamps? Did such emissions also result in air pollution that contributed to the woman's breathing difficulties? While in this case the connections, the apparent causality, would be difficult to substantiate without complex models and a myriad of assumptions, a systems view of the world (often referred to as systems theory) would open the door to a robust inquiry into the interconnectedness of these and many of the other seemingly isolated challenges facing our society.

Understanding Systems

Understanding systems improves our ability to appreciate and respond to the connectedness of the things around us; from natural systems to social and market systems that indeed govern all aspects of our lives. In studying ecosystems and environmental management, we are compelled by the realization that everything in nature is connected to everything else (interconnectedness). Everything is part of the biosphere; the system of life on planet earth. When we significantly impact one part of the biosphere there are ramifications throughout the entire system.

The appreciation of the interconnectedness of all things on earth was at the core of the creation of the environmental movement and formed the basis for many of the professional disciplines that evolved from this holistic perspective. John Muir, considered one of the fathers of this modern movement, observed well over a century ago that “when we try to pick out anything by itself, we find it hitched to everything else in the universe.” He articulated what is often referred to as a biocentric view of the world; where man is but one part of the web of life.

However, also around the turn of the twentieth century, other more mechanistic views of the environment were emerging. Notably, Gifford Pinchot, the first chief of the U.S. Forest Service, advanced a “scientific” approach to the natural world. He viewed natural resource management as the “the art of producing from the forest whatever it can yield for the service of man.” This anthropocentric view values nature as important only in terms of the commodity value of its outputs (e.g. timber), not because its functioning systems afford life or because it possesses any intrinsic value.

These divergent views of man's relationship to the natural world continue to frame much of the current debate around the concept of sustainability and its practical applications for individuals, communities, businesses and society at large. As related to the practice of sustainable development, we are confronted by the reality that many of our

environmental and social challenges derive to no small measure from decisions made with little regard for the consequences felt by the other people and creatures that inhabit this finite and fragile space we call the biosphere. By drawing on a systems approach, we can begin to reconcile these perspectives and facilitate a path toward effective engagement and decision-making. In the words of Donella Meadows, a leader in the field of systems theory who taught at Dartmouth College, to create a truly sustainable future, we need to "think like a system."

In thinking like a system, we must apply the principles of systems theory to understand how self-regulating systems manifest, behave and evolve in the natural world and in human society (i.e. social and economic systems). Key elements of this approach include identifying feedback loops that characterize interactions more effectively than relying exclusively on the identification of more linear cause and effect relationships. Another key element of the systems approach is the appreciation that systems generally are composed of nested subsystems and that such systems in turn are nested within larger systems. Understanding these and other characteristics of systems allows us to apply this approach to problem-solving as a complement to more conventional analytic methods; essentially affording us the ability, again according to Meadows, to "intervene in systems" in ways that avoid the unintended consequences typical of linear approaches to problem-solving. Linear approaches tend to see problems in isolation and seek targeted solutions to tackling specific, currently manifesting problems without effectively understanding and considering broader ramifications.

Knowledge Systems

Merely stating that a problem can be tackled more effectively by employing a systems approach won't necessarily get us to a broadly held systems view or to a systems-based solution to the problem at hand. Systems approaches also need to be applied to the process of learning and to the creation of knowledge. Such knowledge systems are built on collaboration and participatory learning -- inclusive structures that are critical in addressing many of the complex challenges facing our society. Knowledge systems can serve to activate our capacity to draw upon multiple sources of knowledge; not only professional and scientific knowledge, but also practitioner and indigenous knowledge. Such systems of learning and action embrace the realization that no one professional discipline can provide all the answers and that knowledge does not reside exclusively among the ranks of the professionals or in the halls of academe. Practitioners in the field and indigenous people often know best the practical on-the-ground constraints -- the locale, the communities and the history, all aspects of the real world that teach us if we only care to listen.

Knowledge systems, as an approach to learning and collaboration, provide a mechanism to create outcomes which are scientifically sound, relevant to the issues at hand, and respectful of and responsive to the interests of all involved parties. They employ multidisciplinary/multi-stakeholder mechanisms for engagement, collaboration and action. At the core, knowledge systems aim to understand and gently intervene in systems by embracing knowledge of all forms; scientific, practical and indigenous. The

process provides space at the table for technical experts, practitioners and those who will be impacted by the outcomes of the considered actions. To achieve workable outcomes, knowledge systems must be effective in facilitating communication, translation and mediation of the information, perspectives, insights and ideas that are drawn from the involved parties and that can result from the common ground that is staked out. Valuable shared products can result and become the fruit of this collective labor. The products can range from shared definitions of the problem at hand, an agreed upon understanding of the prevailing constraints, to consensus on needed actions and effective plans for implementation.

Knowledge Systems for Sustainable Development

Sustainability challenges are vast, unprecedented and tax our ability to observe, engage and adapt. Notable among these challenges is climate change mitigation and adaptation. However, the path toward sustainability must include attention to biodiversity loss, a myriad of other environmental issues, as well as a suite of compelling social issues notably poverty alleviation and income inequality. A systems view of these issues reminds us that they did not manifest in isolation and that solutions must derive from an appreciation of the synergies that can be visualized and created with the aid of wholistic thinking and collective action.

Indeed, the more that we study, bring depth to and refine the definition of sustainability, the more we come to appreciate that we are just scratching the surface of its profound meaning. Looking around, we are faced with the realization that there are few if any examples of sustainable buildings, agricultural systems, communities or businesses. For that matter, among our ranks, there are few if any sustainability experts. We are all at best just beginning to experiment with associated ideas, philosophies, models and practices. To this end, knowledge systems can play a powerful role in facilitating movement toward resilience and sustainable development. These systems can bring people together on common ground and engage our collective capabilities to seek balance in achieving environmental, social and economic outcomes.

We aim to intervene in complex systems, the intricacies of which only can be understood and acted upon by bringing forth and creating knowledge that simply does not exist in any one place. Knowledge that does exist however, collectively in bits and pieces in each of our minds, disciplines, realms of experience and hearts. Knowledge systems, by bringing forth this collective capacity, provide a practical vehicle for understanding how shortsighted decisions have often yielded unacceptable and unintended consequences. These systems can then go further to facilitate decision-making and implementation to address specific objectives within a broader and mutually reinforcing environmental, social and economic context -- the essence of sustainable development.

Applying knowledge systems can substantially aid in advancing sustainability, whether the endeavor focuses action at the community, corporate, national or global level. For example, at the corporate level, a new tool for corporate sustainability decision-making

that employs a knowledge systems approach is the Corporate Ecosystem Valuation (CEV) tool developed by the World Business Council for Sustainable Development. The CEV facilitates a process to bring together a wide array of business stakeholders who each hold important pieces of knowledge related to a company's ecosystem impacts and dependences. The objective, in bringing together and advancing this collective knowledge, is to identify and manage associated risks and opportunities and then craft strategies for company success.

Conclusion

On the journey toward a resilient and sustainable society, we begin the endeavor with an appreciation and understanding of the complexities of the systems that govern our lives. From there, we can come together to share and create knowledge that can be applied to visualize and bring forth a sustainable future for all the people and other creatures that inhabit this beautiful and dynamic world. Knowledge systems are but one tool to help us on this journey of a lifetime.