Systems Thinking and Change

A Guide for Landscape Stewardship Practitioners

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ABSTRACT

In an effort to create a shared language and understanding for landscape stewardship practitioners, terms related to *systems*, such as *systems thinking* and *systems change*, are defined in this guide. Systems in three classifications—biosphere, social, and technosphere—are highlighted. These three systems all share the characteristics of interconnectedness, interdependency, and dynamism

Systems thinking is a lens through which we can understand, diagnose, and solve complex issues, in addition to a lens for decision-making and future planning. Both a process and an outcome, systems change is the action-oriented side of systems thinking, intended to produce long-lasting change.

This guide concludes with a checklist that can be used when approaching problems through a systems-thinking and systems-change perspective. When applying this perspective, the practice of collaborative leadership is highlighted as the most effective approach to tackling today's complex problems.

PREFACE

The *Future Horizons Roundtable* sponsored by the *California Landscape Stewardship Network* met virtually on November 5, 2020, for a session called "Looking through a Systems Lens." As a participant of the Roundtable and this session, I noticed that the terms s*ystems*, *systems thinking*, and *systems change* were being used by a majority of the participants. I also realized that individuals were attributing different meanings to the terminology. This experience was my impetus for wanting to create a shared language and understanding.

My hope is that landscape-stewardship practitioners use this as a guide to help facilitate communication on the very important work to which they are committed. I am honored to be involved with the *California Landscape Stewardship Network's Future Horizons Roundtable* and to work with those who are truly passionate about caring for our lands and all beings living upon them.

INTRODUCTION

Systems are ubiquitous. We use our respiratory system to breathe the air from the ecosystem in which we live on Earth—a planet within a larger solar system. We rely on systems of language to communicate with others in our community systems when creating business, education, health-care, and political systems. Computer and transportation systems connect us to each other, to information, and to other ecosystems. In essense, we comprise, create, use, and rely on systems each and every moment of our lives.

Systems thinking and systems change have been adopted as effective approaches for understanding phenomena and tackling complex, systemic problems in the context of landscape stewardship. The purpose of this article is to create a shared language and understanding of what ***systems***, ***systems thinking***, and ***systems change***[1] mean for practioners involved in landscape stewardship and conservation efforts.

All things appear and disappear because of the concurrence of causes and conditions.
Nothing ever exists entirely alone; everything is in relation to everything else.

~The Buddha

[1] A glossary at the end of this article defines terms in the order in which they appear.

Systems: Interconnected, Interdependent, and Dynamic

While there are many different types of systems, three main classifications—***biosphere systems, social systems,*** and ***technosphere systems***—are described here. Like all systems, these share the characteristics of interconnectedness, interdependency, and dynamism.

Biosphere systems are found in the parts of the Earth where life exists. Mostly powered by solar energy, the biosphere "drives the biogeochemical cycling of elements like carbon, nitrogen, and phosphorus and other elements essential to life, and plays a significant role in regulating Earth's climate" (Turner 2020).

Terrestrial, ocean, and freshwater ecosystems can be found in the biosphere. These system units include plants, animals, and other organisms and are affected by things such as temperature and humidity. The biosphere is a self-supporting, self-regulating system that "is extremely good at recycling the material it is made of" (Zalasiewicz 2018).

Composed of human beings, social systems have cultural and structural elements. Examples of social systems include families, communities, organizations, and societies. Structural elements include systems of shared language, in addition to governmental, political, legal, educational, economic, and health-care systems. Cultural elements encompass shared values, principles, and beliefs, which, in turn, shape both acceptable norms of behavior and how structural elements are organized.

Technosphere systems are ones that humans in their social systems have constructed to meet their needs. Coined by Peter Haff (2014), the term *technosphere* is defined as "the interlinked set of communication, transportation, bureaucratic and other systems that act to metabolize fossil fuels and other energy resources" (p. 301). It is an autonomous system that appropriates resources for its own use and, unlike the biosphere, has "yet evolved the ability to recycle its own waste stream" (Haff 2014, p. 301).

Systems Thinking: A Way to Approach Complexity

Systems thinking is a lens through which we can understand, diagnose, and solve complex issues, in addition to a lens for decision-making and future planning. A systems-thinking approach underscores the importance of three characteristics shared across all systems: (1) system units are interconnected, (2) units are interdependent—they affect each other, and (3) systems are dynamic in nature.

Systems thinking is particularly applicable for those involved in landscape stewardship. It promotes exploring the interface of different system classifications and highlights the influential role social systems (i.e., groups of people) play in shaping the future of our natural environment. Guided by shared cultural values and organized by social structures, social systems have, are, and will continue to determine if we are on a path to a sustainable future … or not.

Systems thinking is a discipline for seeing wholes.
It is a framework for seeing interrelationships rather than things, for seeing patterns of change rather than static "snapshots."

~Peter Senge

The Intersection of Three Systems Classifications reflects the interconnected, interdependent, and dynamic nature of biosphere, social, and technosphere systems. It also illustrates how our decisions have long-term implications for our natural environment's sustainability.

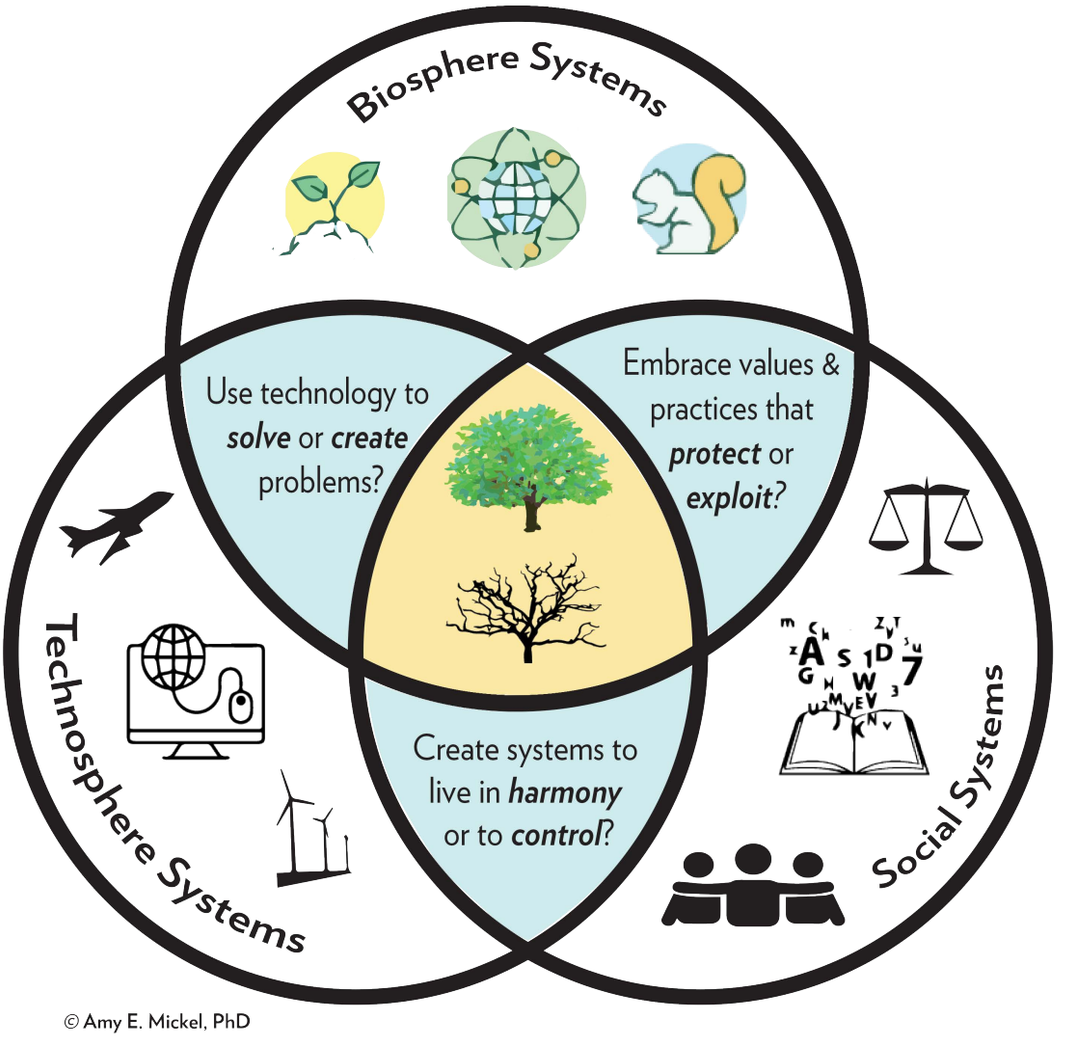
Are values and practices embraced by social systems *protecting* biosphere systems? Are technosphere systems created to operate in *harmony* with the environment? Are technologies used to *solve* biosphere problems? If so, we are on a path leading to a more sustainable future (represented as a healthy, living tree in the diagram).

Conversely, are values and practices embraced by social systems *exploiting* biosphere systems? Are technosphere systems created to *control* the environment? Are technologies used to *create* biosphere problems? If so, we are on a path leading to an insupportable future (represented as a dead, decaying tree).

Highly functioning systems indicate equilibrium, balance, and healthy relationships and interactions within and across systems. Suboptimal performance indicates that there is a breakdown in one or more of the systems, and that there are problems within or across them. Systems thinking is very useful as a lens to diagnose these kinds of complex problems and to generate integrated solutions.

Systems thinking is also an effective approach to contemplating the future of biosphere systems. It is valuable in assessing options and deciding which avenue to pursue to address problems and prevent future issues. Moreover, it promotes thinking about what will likely happen if we do nothing.

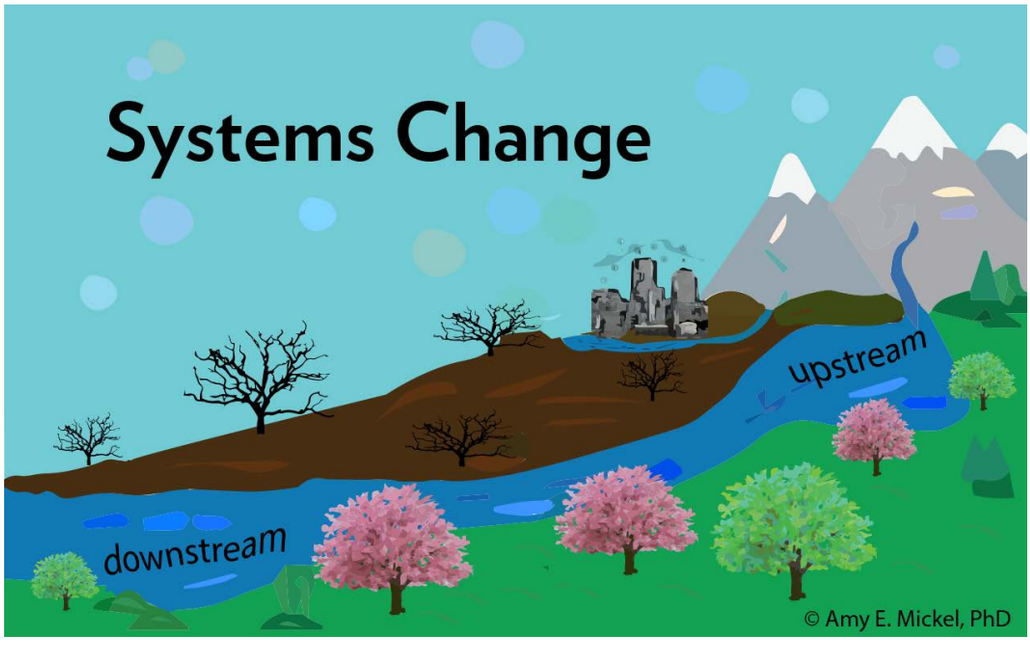
Intersection of Three Systems Classifications



Systems Change: A Process and an Outcome

Systems change as a process is the *doing* or *action-oriented* side of systems thinking. It is an intentional[2] shift in identified systems with purposeful interventions (Foster-Fishman, Nowell, and Yang 2007). Systems change is a practical way to uncover root causes of a set of problems by *looking upstream* and also, a way to evaluate proposed ***systems change interventions*** (i.e., solutions)[3] by *looking downstream*.

Systems change also refers to the desired outcome, the result of effective implementation of integrated solutions designed to tackle complex problems. It specifically pertains to long-lasting change at a systems level.

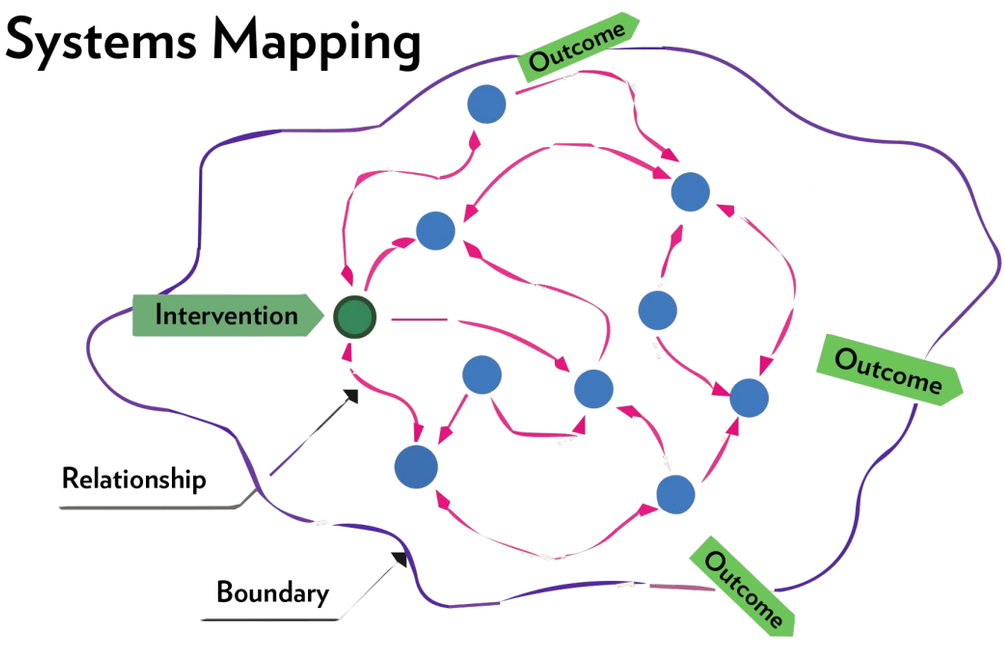


[2] Systems change can also be unintentional, such a new policy implemented to change part of a system, which, in turn, has repercussions for other units in the system.

[3] Systems-change interventions and solutions are used synonymously in this article.

Achieving systems-level change often requires a change in culture. ***Culture*** describes shared values, principles, and beliefs held by members of a social system, which in turn shape both acceptable behavior norms and how structural elements are organized.

Culture change can be accomplished through interventions designed to shift shared values, principles, and beliefs as well as acceptable behavior norms. It requires the members in a social system to embrace this shift by changing their attitudes and behaviors. To successfully generate systems-level change, the majority of the members—especially those individuals who are most influential—need to believe in the changes and *walk the talk*.



Systems mapping is a visual representation of systems. It is a valuable tool to visually establish boundaries around systems of interest, identify key units in the system, and depict how units are related and interconnected. It can also be used to project intended and unintended outcomes of an intervention.

Putting Systems Thinking and Change into Practice

Practicing collaborative leadership is an effective way to approach complex, systemic problems and to generate integrated solutions designed for systems-level change. It is a process involving shared or joint power—no one person or group is in charge (e.g., Chrislip and Larson 1994).

The following checklist can act as a guide for things to consider when approaching problems with a systems-thinking and systems-change perspective. While it is not an exhaustive list, it can provide a place to begin when applying systems thinking to a particular challenge.

- ✓ Describe the problems. Create shared language and shared understanding of the problems.
- ✓ Identify root sources of the problems—*look upstream.*

  Understand how social systems and their cultural and structural elements contribute to problems. Explore the role technosphere systems play.
- ✓ Prioritize which set of problems you and your team would like to address. Consider the questions "What change is needed?" and "Why it is needed?" during this process.

  Since systems are interconnected, you will need to put boundaries around the systems and issues that you want to focus on. Consider systems mapping as a tool to do this.
- ✓ Brainstorm as many interventions as you can that (a) tackle the root sources of the prioritized problems and (b) prevent the problems from reoccurring in the future.
- ✓ Explore if a shift in cultural elements (i.e., values, beliefs, and norms) is necessary. Be creative and include possibilities that may appear unrealistic.

- ✓ Consider social systems (i.e., various communities) along with structural elements (e.g., political, educational, or business organizations) that can help tackle and prevent the prioritized problems.

  Identify and engage additional stakeholders from those social systems.

- ✓ Collaborate and revisit interventions and generate new ones with stakeholders. Consider integrated solutions that are beneficial to as many biosphere and social systems as possible.

  Collaboration is key in generating buy-in from all parties; it is an essential ingredient for developing, planning, and implementing solutions.

- ✓ Assess the various interventions through the lens of thinking about the future and identify unanticipated outcomes—*look downstream*. You need to be a devil's advocate. Consider the question, "What might the unintended consequences be?"

- ✓ Evaluate and rank interventions on multiple factors such as feasibility, benefits to biosphere and social systems, costs to biosphere and social systems, and so forth.

- ✓ Prior to intervention implementation, build in ways to evaluate the efficacy of the intervention and to assess systems-level changes over time.

If you do not understand your role in the problem, it is difficult to be part of the solution.

~David Peter Stroh

Glossary of Terms

These are listed in the order they are referenced in this article.

Systems share three characteristics: (1) system units are interconnected, (2) units are interdependent—they affect each other, and (3) systems are dynamic in nature.

Systems thinking is a lens through which we can understand, diagnose, and solve complex issues, in addition to a lens for decision-making and future planning. A systems-thinking approach underscores the importance of understanding interconnectedness, interdependency, and dynamism as system qualities.

Systems change is both a process and an outcome. As a process, it is the d*oing* or a*ction-oriented* side of systems thinking. As an outcome, it is long-lasting change at a systems level.

Biosphere systems are those that can be found where living things exist, which includes terrestrial, ocean, and freshwater ecosystems. The biosphere is extremely good at recycling the material that it is made of.

Social systems are composed of human beings and have cultural (i.e., shared values, principles, and beliefs) and structural elements (e.g., shared language and political, educational, economic, and healthcare systems). Families, communities, organizations, and societies are examples of social systems.

Technosphere systems are ones that human social systems have constructed to meet their needs (e.g., smartphones, computers, factories, houses, cars, freeways, planes, and so forth). The technosphere metabolizes fossil fuels and other energy resources and is very poor at recycling materials.

Intersection of Three Systems Classifications reflects the interconnected, interdependent, and dynamic nature of biosphere, social, and technosphere systems.

Systems change interventions are purposeful, integrated solutions designed to tackle complex, systemic problems.

Culture describes shared values, principles, and beliefs held by members of a social system, which, in turn, shape both acceptable norms of behavior and how structural elements are organized.

Culture change is a shift in shared values, principles, beliefs, and acceptable behavior norms held by members of a social system. Culture change requires members of a social system to embrace this shift through changing their attitudes and behaviors.

Systems mapping is a visual representation of systems, including boundaries, units, and relationships.

References

Chrislip, D. and C. Larson. (1994). *Collaborative Leadership: How Citizens and Civic Leaders Can Make a Difference*. San Francisco: Jossey-Bass.

Foster-Fishman, P., B. Nowell, and H. Yang. (2007). Putting the system back into systems change: a framework for understanding and changing organizational and community systems. *American Journal of Community Psychology* 39: 197–215.

Haff, P. K. (2014). Technology as a geological phenomenon: implications for human well-being. In *A Stratigraphical Basis for the Anthropocene,* edited by C. N. Waters, J. A. Zalasiewicz, M. Williams, M. A. Ellis, and A. M. Snelling. Geological Society, London, Special Publications 395: 301–309.

Turner, D. P. (2020, November 8). "What Technosphere Response to Covid-19 Says About Earth System Dynamics." *Taming the Technosphere (An Earth System Science Blog)*. https://blogs.oregonstate.edu/technosphere/tag/biosphere/

Zalasiewicz, J. (2018). The unbearable burden of the technosphere. *The UNESCO Courier*. https://en.unesco.org/courier/2018-2/unbearable-burden-technosphere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