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).

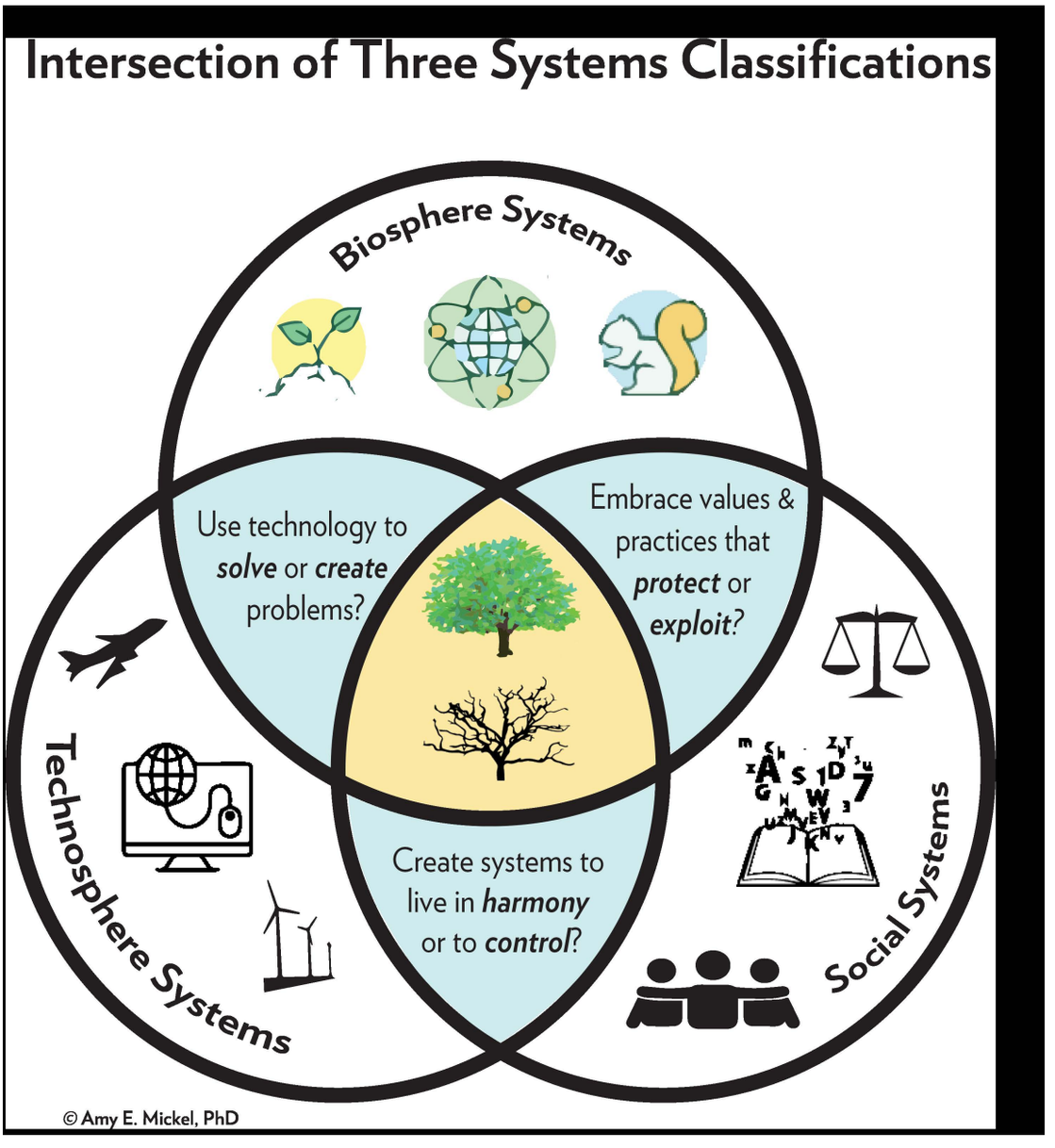
Systems Thinking: A Way to Approach Complexity

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


Intersection of Three Systems Classifications
Biosphere Systems
Use technology to solve or create problems?
Embrace values & practices that protect or exploit?
Technosphere Systems
Social Systems
Create systems to live in harmony or to control?
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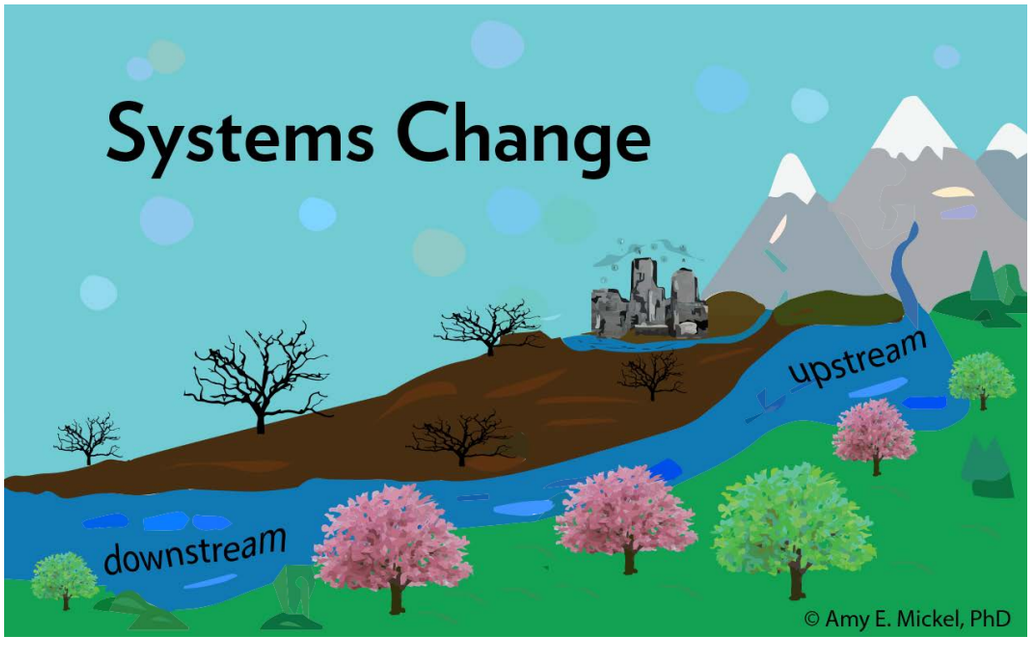
Systems Change: A Process and an Outcome

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.

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.

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