



## Review

## A social-ecological systems approach for environmental management



Arika Virapongse <sup>a, b, \*</sup>, Samantha Brooks <sup>c</sup>, Elizabeth Covelli Metcalf <sup>d</sup>, Morgan Zedalis <sup>e</sup>, Jim Gosz <sup>f</sup>, Andrew Kliskey <sup>a</sup>, Lilian Alessa <sup>a, g</sup>

<sup>a</sup> Center for Resilient Communities, University of Idaho, Moscow, ID 83844, USA

<sup>b</sup> Tropical Conservation and Development, Center for Latin American Studies, University of Florida, Gainesville, FL 32611, USA

<sup>c</sup> Madison River Group LLC, Ashburn, VA 20148, USA

<sup>d</sup> College of Forestry and Conservation, University of Montana, Missoula, MT 59182, USA

<sup>e</sup> Heritage Program, Payette National Forest, United States Forest Service, McCall, ID 83638, USA

<sup>f</sup> Department of Forest, Rangeland, and Fire Science, University of Idaho, Moscow, ID 83844, USA

<sup>g</sup> International Arctic Research Center, University of Alaska Fairbanks, Fairbanks, AK 99775, USA

## ARTICLE INFO

## Article history:

Received 22 December 2015

Received in revised form

16 February 2016

Accepted 17 February 2016

Available online 28 April 2016

## Keywords:

Social-ecological systems

Environmental management

Natural resource management

Land management

## ABSTRACT

Urgent environmental issues are testing the limits of current management approaches and pushing demand for innovative approaches that integrate across traditional disciplinary boundaries. Practitioners, scholars, and policy-makers alike call for increased integration of natural and social sciences to develop new approaches that address the range of ecological and societal impacts of modern environmental issues. From a theoretical perspective, social-ecological systems (SES) science offers a compelling approach for improved environmental management through the application of transdisciplinary and resilience concepts. A framework for translating SES theory into practice, however, is lacking. In this paper, we define the key components of an SES-based environmental management approach. We offer recommendations for integrating an SES approach into existing environmental management practices. Results presented are useful for management professionals that seek to employ an SES environmental management approach and scholars aiming to advance the theoretical foundations of SES science for practical application.

Published by Elsevier Ltd.

## Contents

1. Introduction .....	84
2. SES science .....	85
3. A shifting paradigm for environmental management .....	85
3.1. Evolution of management approaches in the U.S. ....	85
3.2. Current challenges for environmental management .....	86
3.2.1. Addressing broader scales .....	86
3.2.2. Conflicting stakeholder worldviews .....	86
3.2.3. Managing for abrupt change and adaptability .....	86
3.2.4. Scale mismatch .....	86
3.2.5. Institutional limitations .....	86
3.2.6. Lack of empirical evidence .....	86
4. An SES approach to environmental management .....	87
4.1. Systemic worldview .....	87
4.2. Transdisciplinary approaches .....	87
4.2.1. Co-development of knowledge .....	88
4.2.2. Stakeholder engagement .....	88

\* Corresponding author. Tropical Conservation and Development, Center for Latin American Studies, University of Florida, Gainesville, FL 32611, USA.

E-mail address: [avirapongse@gmail.com](mailto:avirapongse@gmail.com) (A. Virapongse).

4.3. Adaptive governance .....	88
4.4. Monitoring systems .....	89
4.5. Education and training .....	89
5. Conclusion .....	89
Acknowledgments .....	90
References .....	90

## 1. Introduction

It is well recognized that natural resource and environmental issues occur at the intersection of complex natural and social systems (Berkes et al., 2003). Despite this recognition, conventional approaches to environmental management continue to follow disciplinary lines to address challenges. Solving environmental problems more effectively requires increased integration of social and natural sciences, novel governance approaches, and a new culture for environmental stewardship. An articulated framework is needed to engender such characteristics into an environmental management approach.

Transdisciplinary approaches and resilience objectives are rapidly developing across science and practice to inform and improve environmental decision-making (PCAST, 2011; NSTC, 2014). Transdisciplinary approaches merge interdisciplinary efforts together to address complex temporal, spatial, and organizational scales and build conceptual bridges between disciplines to solve real world challenges (Schensul et al., 2006; Tress et al., 2005; Van der Leeuw et al., 2011). Resilience is defined by the capacity of a system to adapt to disturbances and changes in the environment (Berkes et al., 2003; Young et al., 2006). With goals to enhance a system's ability to withstand disturbances, transdisciplinary science and resilience concepts are applied to challenges in many fields, including healthcare (Crow, 2011), food security (Hunt and Thornsby, 2014), disaster risk reduction (UNISDR, 2012), and environmental management (Pohl, 2005; Schensul et al., 2006).

In the field of environmental management, Social Ecological Systems (SES) science can bring these concepts together by exploring the theoretical underpinnings for transdisciplinary science and resilience through development of conceptual and empirically based models and frameworks. SES science frames relationships between human and ecological components as part of a complex system with multi-scale feedbacks and dependencies (Berkes et al., 2003; Liu et al., 2007; Walker et al., 2006). There is rich opportunity for SES theory and practical application to partner in meeting the shared goals of advancing transdisciplinary approaches, improving system resilience, and increasing success of environmental management outcomes.

In this paper, we seek to bridge theory with practice by defining a framework for an SES approach to environmental management in the United States (U.S.) through synthesis of literature and presentation of real world examples. First, we define SES science concepts that are relevant to environmental management. Then, we describe the current challenges faced by environmental managers. We identify key components of an SES environmental management approach that are distinguishable from prevalent environmental management frameworks, and offer recommendations for integrating an SES approach into existing environmental management practices. Results of this study are useful for management professionals that seek to employ an SES environmental management approach in their work and scholars that aim to advance the theoretical foundations of SES science for practical application.

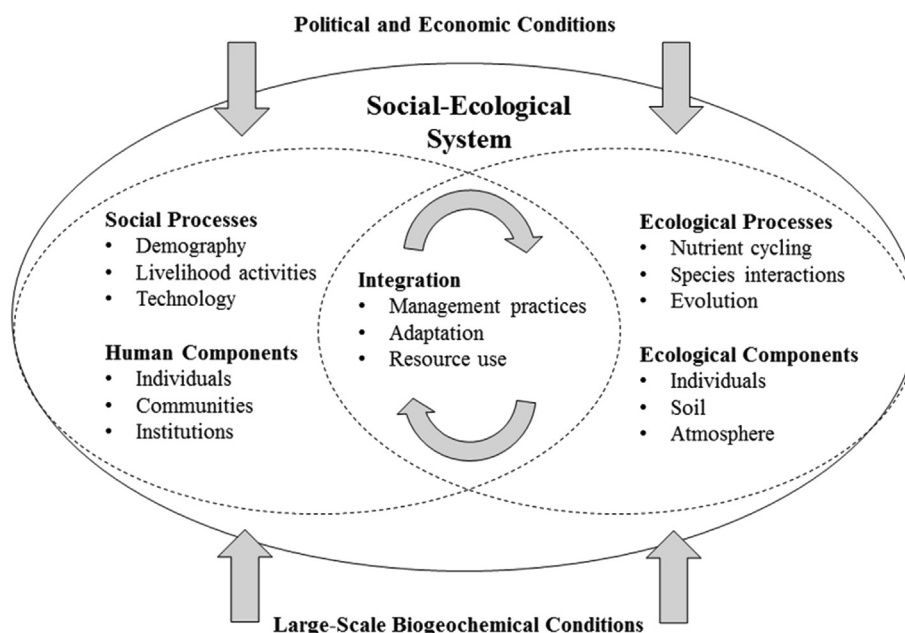


Fig. 1. Depiction of an SES (adapted from SNRE, University of Florida, (2015)).

Download English Version:

<https://daneshyari.com/en/article/1055363>

Download Persian Version:

<https://daneshyari.com/article/1055363>

[Daneshyari.com](https://daneshyari.com)