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Re-envisioning Global Rangeland Stewardship: An Ecosystem Services Assessment Framework

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Abstract

Rangeland stewardship may be enhanced by transforming the global narrative from one of 'resource scarcity and unpredictability' to one of 'global rangeland value'. This may be accomplished by devising a stewardship strategy founded on a more complete accounting of rangeland ecosystem services to inform land use planning and decision making. An ecosystem services framework may provide the necessary feedbacks to identify and assess potential tradeoffs among ecosystem services prior to implementing land use actions and policy. The ultimate goal of this alternative stewardship strategy would be to provide optimal combinations of ecosystem services to meet the needs of global citizens, while improving the well-being of millions of rangeland residents who are highly dependent upon provisioning services.

Introduction

Rangelands represent the largest land cover type on Earth and they provide diverse ecosystem services in support of humanity, including 2 billion rangeland residence (MA 2005). Yet, poverty and resource sustainability continue to represent major challenges to rangeland social-ecological systems. Even though many challenges confronting global rangelands have been recognized, an insufficient framework exists to identify and interpret these complex challenges and effectively prioritize actions and investments to address them (Dougill et al. 2012; Davies et al. 2015).

Insufficient solutions to persistent rangeland challenges may partially be a consequence of a powerful rangeland marginalization narrative. The extent to which rangelands are marginalized is inherent in the terms used to describe their limited capacity to provide forage, food and fiber; i.e., unpredictability, resource scarcity, sparse human populations, and remoteness—collectively termed the drylands syndrome (Reynolds et al. 2007). This narrative may have originated during the 19th century in western Europe based on mischaracterization of drylands as forested systems that had been degraded by pastoral exploitation, rather than a consequence of climate and environmental conditions (Davis 2016).

Institutions, policies and development programs responsible for pastoral and rangeland challenges may continue to be impeded by legacies of the marginalization narrative. For example, development programs often emphasize land improvement or recovery to a more desirable condition without necessarily referencing the desired condition. Agricultural strategies frequently emphasize the introduction of commercialized systems that optimize production to enhance food security, but emphasis on targeted short-term goals may fail to address the management of risk, uncertainty, indigenous knowledge and cultural norms (Rohde et al. 2006; Davies et al. 2015). There is growing recognition that some of these programs and policies have exacerbated the very problems they were intended to resolve, thereby increasing both resource degradation and poverty.

A critical, but underappreciated, consequence of the marginalization narrative is that the majority of rangeland ecosystem services are undervalued, either within or beyond the market economy (Sayre et al. 2013) (Fig. 1). This creates conditions in which numerous ecosystem services—other than highly valued provisioning services—may become externalities during policy development and implementation because

they are unrecognized or undervalued relative to alternative land uses (Dougill et al. 2012; Davies et al. 2015). The adverse impact of land privatization on wildlife populations in African rangelands represents an example of this outcome (Niamir-Fuller et al. 2012).

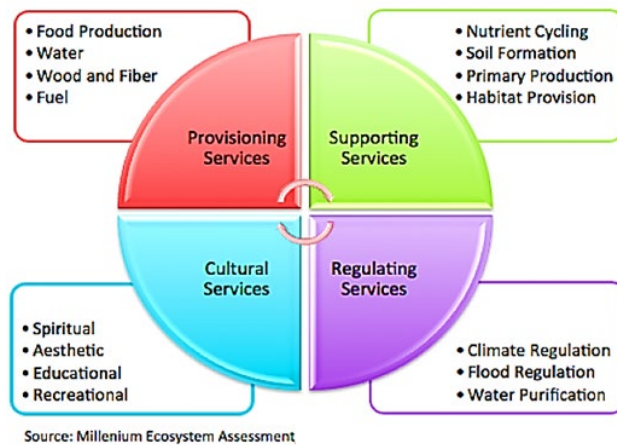


Fig. 1. Categories and examples of ecosystem services.

conservation mechanism. Total ecosystem services supplied by communal rangelands may be of greater total value than those of commercially managed rangelands when both monetary and non-monetary benefits are assessed (Favretto et al. 2016).

The aggregate value of regulating, supporting and cultural services associated with global rangelands may be of equal or greater value than those of the select provisioning services that are currently emphasized (Sayre et al. 2013; Sutton et al. 2016). Accelerating global drivers — human population growth, climate change and ineffectual governance — have seriously challenged the sustainability of pastoral systems, as evidenced by declining ecological and social conditions (Coppock et al. 2017). Consequently, greater demands are placed on select provisioning services, with marginal benefit to rangeland residence, while compromising the ecological capacity of rangeland systems to provision diverse ecosystem services to global citizens (Briske et al. 2020).

Therefore, the fundamental challenge facing the global rangeland community may be how to best transform rangeland social-ecological systems to provide optimal combinations of ecosystem services to meet the needs of global citizens, while improving the well-being of millions of rangeland residents highly dependent upon provisioning services (Sutton et al. 2016; Coppock et al. 2017) (Fig. 2). The central challenge associated with this transition between stewardship strategies would be the complex tradeoffs that exists among individual beneficiaries of provisioning services and ecosystem capacity to provision diverse ecosystem services to benefit society (Briske et al. 2020). The ultimate objective would be to solicit sufficient societal payment for regulating, supporting and cultural services to reduce the need for provisioning services by local inhabitants, especially those with a high degree of resource dependency (Dougill et al. 2012).

Stewardship founded on the totality of ecosystem services would be strengthened by international cooperation given that rangelands exist in numerous countries and on all continents (van Kerckhoff and Szlezak 2016). For example, the Food and Agriculture Organization (FAO) recently completed a Global Forest Reassessment in which numerous global and national forest statistics were referenced to a 1990 baseline (FAO 2020). However, a specific international organization has not been designated, or has assumed, responsibility for global rangeland stewardship. Rangeland programs occur in multiple organizations, but a procedure does not appear to coordinate them, which may minimize their collective

An Alternative Stewardship Strategy

An alternative stewardship strategy is required to replace the 20th century strategy that focused on production of select provisioning services, specifically forage and livestock production. An alternative strategy could be founded on a more complete accounting of ecosystem services provisioned by rangelands with specific emphasis on global human well-being, in addition to that of rangeland residents (Dougill et al. 2012; Reed et al. 2015). Rangelands contain 30% of the global C pool, 8 of 25 biodiversity hot spots and numerous charismatic mammals, 24% of all languages, and numerous world heritage sites (MA, 2005). This alternative strategy is founded on the premise that extensive rangeland use may represent an effective

impact. Consequently, a comparable statistical assessment of global rangelands has yet to be conducted so that the extent and trajectory of global rangelands remain ill-defined (Lund 2007).

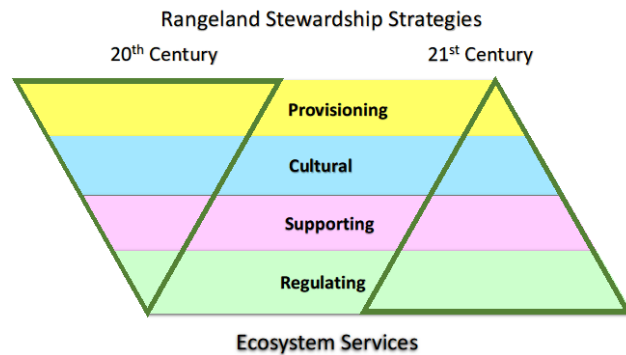


Fig. 2. Inversion of ecosystem service priorities supporting 21st century rangeland stewardship.

Creation of Missing Feedbacks

Non-provisioning ecosystem services frequently become externalities because insufficient feedbacks exist to incorporate their full costs in economic transactions. Greater knowledge of critical feedbacks would provide desperately needed procedures to identify and assess potential tradeoffs among ecosystem service categories prior to implementing land use actions and policy decisions (Fig. 2). An assessment of potential tradeoffs would require evaluation among specific groups or bundles of ecosystem services (Reed et al. 2015). The complex logistical and ethical challenges encountered with exclusive monetary

valuation of ecosystem services may be circumvented by the assignment of relative values. Deliberative monetary valuation may be an effective procedure because it is based on a combination of economic and political approaches that provides an aggregate societal value of ecosystem services (Vatn 2009). Desired proportions of ecosystem service categories could be developed for specific regions to create an ecosystem services portfolio.

An ecosystem services framework may facilitate existing programs by creating additional opportunities to assess and leverage rangeland value relative to alternative land uses. For example, land degradation neutrality (LDN) has emerged as a prominent goal for rangeland development (Chasek et al. 2019). The explicit goal of LDN is to maintain or increase the quality of land resources necessary to support ecosystem functions and services, and enhance food security. An ecosystem services framework could further support these goals by identifying baselines against which achievement is measured, and strengthen the necessary counterbalancing mechanisms. Explicit emphasis on ecosystem services may provide a common currency to enhance synergistic partnerships among the U.N. Convention to Combat Desertification, U.N. Convention on Biological Diversity, U.N. Framework Convention on Climate Change, and International Union for the Conservation of Nature, as recommended in U.N. Sustainability Goal #17 – strengthen global partnerships for sustainable development (Chasek et al. 2019; Reyers and Selig 2020).

Development of an ecosystem services framework could broadly follow procedures used to create the LDN conceptual framework (Chasek et al. 2019). It consists of five modules: 1) vision and goals, 2) frame of reference, 3) counterbalancing mechanisms, 4) implementation pathway, and 5) monitoring outcomes; additional information could be derived from the target-setting procedures. Diverse representation among international organizations responsible for rangeland resources could encourage development of a robust and equitable framework and buttress the credibility of its application. The heterogeneous nature of rangelands would require development of a broad assessment framework that could be variously adapted for regional application. Alternative, novel approaches promoting integrated stakeholder engagement may prove essential for successful implementation (Coppock 2019). Institutional leadership, policies and financial resource availability, delivered as state-community partnerships, may represent essential requirements to successfully implement this transformation (van Kerkhoff and Szlezak 2016).

Implications

The transition from a stewardship strategy that emphasizes primarily provisioning services to one that accounts for the full array of ecosystem services represents a difficult, but necessary challenge. It is imperative that an ecosystem services assessment framework emphasizing the benefits of rangelands to

global citizens provide sufficient societal compensation to partially offset the need for provisioning services by rangeland inhabitants, especially those with a high degree of resource dependency. This framework will require governance structures that can ensure equitable wealth distribution derived from rangelands to promote adaptive capacity and human well-being in pastoral social-ecological systems. An ecosystem services framework may complement and strengthen attainment of several U.N. Sustainability Goals, including LDN, by providing an additional mechanism to quantify targets and assess outcomes. These recommendations are admittedly bold and aspirational, but necessary to recognize and promote the global value of rangelands and the diverse and vital ecosystem services they deliver to humanity.

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