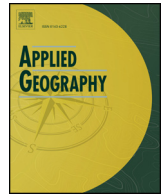




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# Incommensurable or inexorable?: Comparing the economic, ecological, and social values of exchanged multiple use lands

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## ABSTRACT

Land exchanges are a process increasingly being used by state government and private industry to facilitate extractive development on lands bounded within or contiguous to federal public lands. These swaps were originally intended as a legal tool to reconfigure property ownership in a contiguous pattern and thereby align land use, management, and conservation priorities. However, in doing so access to locally significant multiple use activities, like hunting as is the case here, end up redistributed to properties that have different levels of ecological and social value that are not necessarily integrated into the economic value of exchanged lands. The Bearlodge land exchange, occurred between state and private lands in two different areas of the Black Hills National Forest and was undertaken by Rare Element Resources Ltd. in coordination with the State of Wyoming to obtain ownership of a state section adjacent to the mine's lease on U.S. Forest Service land. The acquisition of the adjacent section was deemed necessary by the mining corporation to collocate a waste tailing pile next to the mine. In this case, the different types of value - economic, social, and ecological - are individually assessed and collectively compared between exchanged lands using a mixed methods approach. Findings demonstrate that while exchanges may be roughly equivalent in constructed economic value, the social and ecological components underpinning assessed property value in the trade are inequivalent due to differences in place-based connections of recreational amenities and the ecological composition unique to each parcel.

## 1. Introduction: fragmented landscapes, connected values

The U.S. federal government acquired over 1.8 billion acres of nearly contiguous land over the course of western frontier expansion. The sectional surveys that were employed to allocate the land and its resources de-physicalized the material nature of the landscape and flattened local cultural customs governing exchange, thereby creating a fungible and placeless uniform system of exchange, capable of being infinitely traded without regard to place-specific social factors or ecological conditions (Graham, 2011). Through congressional acts nearly 1.3 billion of these acres were conveyed to private ownership for ranching, railroads, mining, timber, and grazing, while 70 million acres of specified township and range sections – usually the 16th and 36th under the Morrill Act - were conveyed to states to generate income for the public good, often to fund land grant colleges from the value of extraction and more recently recreation (Miller, 2013). The western landscape has thus emerged as a checkerboard of public and private lands, where issues that transcend property boundaries, such as wildlife habitat, remain a challenge for managers (Charnley, Sheridan, & Nabhan, 2014; Nie & Miller, 2010). Such is the case in the Black Hills of Wyoming and South Dakota, which are regarded as the nation's

preeminent multiple use landscape where locally significant and culturally valued activities like big game hunting take place among timber stands, grazing allotments, and mining development (Geores, 1996). In fact, the Black Hills National Forest is the most fragmented unit of the U.S. Forest Service system containing within its boundaries over 300,000 acres of privately owned land within its 1,534,000 total acres (Black Hills National Forest, 2011).

Land exchanges in the United States are a relatively old government practice which dates to the Weeks Act of 1911 and the General Exchange Act of 1922; the former of which was legislated to enable the acquisition of land to conserve previously logged and impacted watersheds through more contiguous federal holdings amid the checkerboard, while the latter gave the Forest Service broad oversight of individual land exchanges, an authority once held by congress on a case by case basis (Blaeloch, 2009). This devolution of authority has continued to the present day with resource dependent states who oversee land exchange processes for holdings under their purview, a large portion of which are the 16th and 36th sections. The difference, however, between resource-dependent state governments and federally administered land exchanges of yesteryear and today that acquire and convey inholdings to create more contiguity for conservation and

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management purposes has to do with who is incurring the benefit. State governments, including Wyoming, Arizona, and Minnesota have all recently pushed through land exchanges to incentivize and facilitate corporate extractive mineral development, but at the expense of recreational, cultural and ecological services that these lands provide for the public good (Phadke, 2017). While the argument that mine development can help boost the state and local economy is nothing new, it almost never outweighs the long term ecological costs, and many of these proposed mines never get beyond the permitting and pre-development, often due to a combination of the high investment costs associated with infrastructure and processing technology along with speculated upon commodity demand that doesn't bear out. What is impacted through this land exchange process, regardless of how far the mine's development gets, is the access to recreational amenities of public lands, which provide a large share of the sustained income for rural economies throughout the American West (Deller, Tsai, Marcouiller, & English, 2001; Gosnell & Abrams, 2011; Rasker, 2006; Rudzitis, 1999).

The issue of who derives benefit from the land, through what type of institutional arrangement individuals, corporate interests, and governments gain right to resources, and at what costs to others is of central importance to any discussion on governance and land use (Dietz, Ostrom, & Stern, 2003). For some property rights are indispensable for protecting the most vulnerable sections of society, while for others these rights are the main cause of the marginalization of the disadvantaged. This convoluted likely stems from two competing notions: property as an abstract basic right and property as a concrete title (Moroni, 2018). Those who gain exclusive access to landed resources via a concrete title often incorrectly assume that this affords them control over any and all economically commodifiable resources therein. However, this perspective ignores non-market social and ecological values that can be impacted by the externalized costs of extraction or production and thereby infringe on the abstract basic rights (valid, though not writ into law) of those without exclusive access who are either spatially or temporally displaced; examples here might include pollution that transcends property boundaries in the form of air or water (spatial displacement of rights), or extraction that precludes or eliminates other values of the site at some point in the future when exclusive access is ceded, repatriated, or sold (temporal displacement of rights). This unabated exploitation of a finite resource base and the inevitable exhaustion of the resource is popularly known as the tragedy of the commons. One way to avoid this struggle is through the institutional coordination of supply and demand of goods, whether land or commodities therein, between actors in a way that overcomes these spatial and temporal displacement of rights, or scalar contradictions of capital (Harvey, 1996). What is needed is a system for comparability of “good” in a way that optimizes both the abstract basic rights and concrete title for maximum benefit of those actors involved. However, what ought to be maximized as “good” to one may not be perceived as such by another actor or institution: property assessed for its future value as the mine's waste tailings site, the intrinsic value of biological diversity, and the locally significant social value of big game hunting. Theoretically speaking, comparison of one good with another is impossible because goods are incommensurable, the very definition of incommensurable is something that cannot be compared. Therefore, a necessary assumption to avoid the tragedy of the commons is that there exists, or can be developed, a “criterion of judgement and system of weighting” that will render the incommensurables commensurable in real life (Hardin, 2009). Economic systems of exchange rest on the assumption that measurement is uniform and comparable between different types of goods, but the very nature of this system of abstraction is one of disconnected components parts alienated from otherwise incommensurable ecological and social systems (Robertson, 2012). Through what forms of knowledge these units of capital are socially constructed, how these measurements are made comparable in practice, and in the interest of whom are essential steps to unravel the political

from development and gain clearer insight into the genesis of policy (Bebbington & Bury, 2013).

Ecological values are often inaccurately perceived to be incorporated into the value of property as a commodity. In this prevailing market rationale nature is made into an exchangeable commodity through epistemologies of abstraction, such as quantifiable units of weight, volume or time (e.g. animal unit months, million board feet of timber, and tons of ore), which are entangled with the perceived “good” of different political economic actors and institutions (Ernstson, 2013; Mulvaney, 2014; Robertson, 2006). Assessment of property value is part of the socially constructed commodification of nature where nature's diverse qualities and ecological holism are reduced to the point that everything about nature is ignored aside from its “merchantable” aspects (Demeritt, 2001). This process of standardization creates economic value that is easily exchangeable in a market although incommensurable with the non-monetized elements of ecology, and therefore not well suited for comparability (Martinez-Alier, Munda, & O'Neill, 1998). To overcome the theoretical limitation of incommensurables, or what is deemed “good” (or valuable) by whom and how, one must necessarily leverage ecological epistemologies to measure and compare qualities such as plant diversity and habitat composition which can serve as proxies for nature's non-economic instrumental value (Justus, Colyvan, & ReganMaguire, 2009).

Similarly, social values are typically defined in terms that seek economic equivalency, such as willingness to pay for recreational amenities (Barrio & Loureiro, 2010), or hedonic pricing based on the monetary value of life to assess hunting quality (Bowes & Krutilla, 2014). Place based attachment, or sense of place, is one way to understand the social value of locally significant activities, which can be abstracted into non-market yet monetarily equivalent economic terms (Cross, Keske, Lacy, Hoag, & Bastian, 2011; Keske & Mayer, 2014). Place attachment refers to the positive emotional bonds that develop between individuals and their environment including feelings on how the physical setting provides meaning to life, and place dependent connections between individuals that collectively support an intended cultural, recreational, or utilitarian use (Brown & Raymond, 2007). In many rural communities' big game hunting is a socially valued and locally significant cultural activity reified through the necessary rights of access and resource base provided by public lands (Dizard, 1999).

## 2. Background: the Bearlodge land exchange

The Bearlodge rare earth mine was first proposed near Sundance, Wyoming in 2011 by Rare Element Resources, a Canadian-based mining corporation. The proposed mine and associated infrastructure are located at the core of the Bearlodge Mountains across 1700 acres, including 1060 acres of U.S. Forest Service mineral claims where 232 acres of open-pit mine development and associated processing activity would take place. In early 2016, after a lengthy permitting process, which involved scientific studies and opportunities for public comment, the U.S. Forest Service issued the draft environmental impact statement for the mine, which is the main legal process for environmental review and mandated for projects taking place on federal lands. Perhaps not surprisingly, just one week after the environmental impact statement was issued Rare Element Resources suspended the Bearlodge project indefinitely due to lack of capital and unfavorable rare earth market conditions. However, as recently as October 2017 strategic investments were once again being made to acquire minority shares of Rare Element Resources and keep the otherwise idle lease in a ready-to-go state, should market conditions allow for development of the mine. To get to this point of imminent development would not have been possible without the land exchange, which in the eyes of Rare Element Resources was necessary for the project to be economically viable in that it wouldn't have to ship waste rock off-site and pay disposal fees, but rather could simply truck it to the adjoining parcel, which now after being exchanged is a privately-owned inholding surrounded by

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