

3rd International Conference on **Biodiversity & Sustainable Energy Development**

June 24-26, 2014 Valencia Conference Centre, Valencia, Spain

Ecosystem externalities and energy development in the Intermountain West

Alfredo Cisneros Pineda

University of Wyoming College of Business, USA

The demand for energy development and new technologies for extracting natural gas have led to rapid growth in the energy sector in the Intermountain West. However, energy development is also accompanied by negative externalities on biodiversity. To examine these ecosystem externalities, we build an integrated economic and general equilibrium ecosystem model (GEEM) that includes a complex food web of plants and animals from a rangeland ecosystem.

In the GEEM, the dynamics of species populations are consistent with ecological principles, but modeled with microeconomic methods. Individual plants and animals are assumed to behave as if they maximize their net energy over each reproductive time period. Individual animals maximize by choosing the biomass they consume from prey species. Plants maximize biomass accumulation, with more biomass accruing from more photosynthetic energy. At each iteration of the GEEM, population densities of the species are updated by assuming that a portion of the accumulated energy is used in reproduction.

We consider how various energy development scenarios impact the habitat of the species that avoid the well pad areas: sage grouse and elk. For every scenario we calculate how all the plants and animals optimally respond to the changing landscapes. In turn, these impacts on the ecosystem affect the services derived from the rangeland ecosystem: cattle grazing, hunting, and wildlife viewing. As expected, the introduction of natural gas wells is predicted to cause a decline in the population of species. This decline in species' populations reduce the benefit of hunting, livestock grazing, and wildlife viewing.

Biography

Alfredo Cisneros obtained his undergraduate degree with a major in economics at the Center for Research and Education in Economics where he presented a thesis titled "Identification of limit cycles in natural resources economics. The case of phosphorous fixation of agricultural soils". Alfredo just finished the second year of the PhD in economics at the University of Wyoming where he works as an assistant of Dr. David Aadland and Dr. John Tschirhart doing research on the project described here. He has 4 years of work experience at the National Institute of Ecology and Climate Change (Mexican Ministry of Environment).

acisner4@uwyo.edu