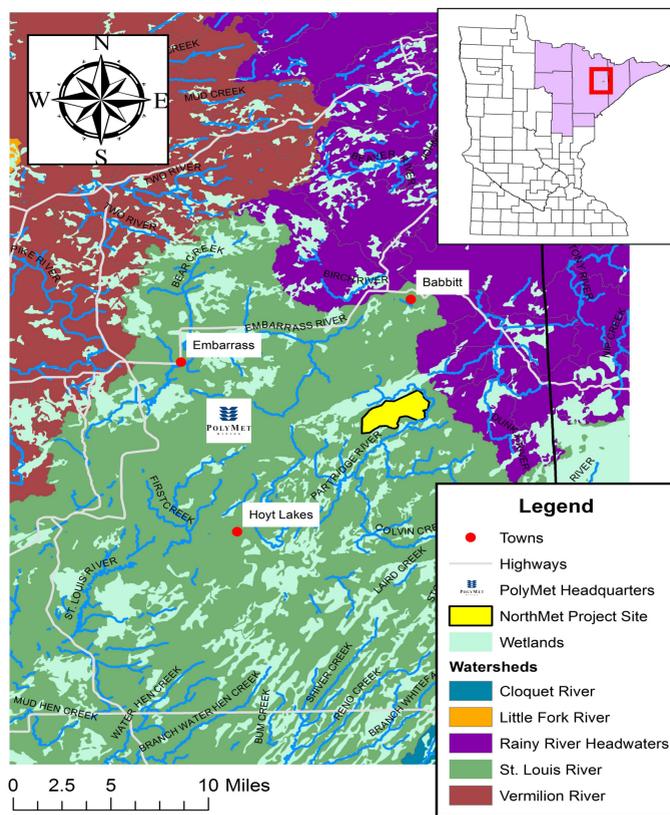


Nature's Price Tag: An Economic Analysis of the NorthMet Project

Abstract

One of the largest problems facing the environment is the conversion of value into price; the pricing of ecosystem goods and services such as clean water or nutrient cycling is not indicative of its true value. In Northern Minnesota, the NorthMet Project, a proposed copper and nickel sulfide mining development by PolyMet Mining Corporation, threatens the environmental and social values of this region. How do we place a fair, economic price on the future, intangible benefits of environmental goods and services? An economic valuation analysis of the market and non-market values for the NorthMet Project can help to construct a more accurate framework with which to make informed choices about the economic benefits versus the environmental costs. I considered the preexisting research including specific case studies and drew from various valuation models to construct my own analysis for the NorthMet Project. I conclude that PolyMet Mining Corporation and consumers alike must reevaluate the importance of non-market values and the implications of consumer behavior, not only within the context of the proposed NorthMet Project, but for all environmental goods and services.

The NorthMet Project



Source: Created by Kelsey Torchia using ArcMap GIS Software.

PolyMet Mining Corporation controls 100% of the NorthMet ore deposit, one of the largest copper and nickel sulfide ore deposits in the world. Since 2005, PolyMet has begun the process of exploring this deposit through their proposed NorthMet Project. This mining project would be the first of its kind in Minnesota: open-pit **sulfide mining**. This type of mining has never been performed without adversely affecting the environment, specifically through sulfuric acid contamination. The NorthMet Project carries with it both potential economic benefits such as tax revenues and significant environmental costs, primarily in the aquatic ecosystems of Northern Minnesota.

Impact of the NorthMet Project

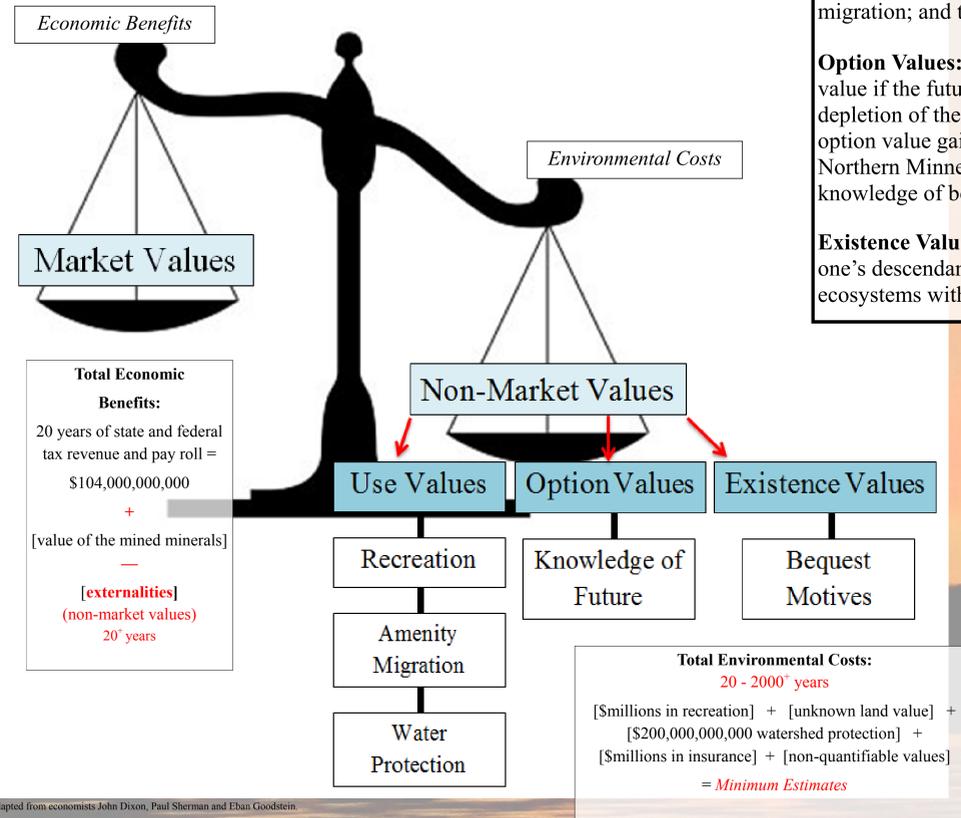


Table adapted from economists John Dixon, Paul Sherman and Eban Goodstein.

Use Values: Value in use. These are the values such as recreation; the value of the land that makes people move to it, called amenity migration; and the value of the use of clean water.

Option Values: An environmental resource will have option value if the future benefits it might yield are uncertain and depletion of the resource is effectively irreversible. There is an option value gained from protecting the aquatic systems of Northern Minnesota if people want the option and have the knowledge of being able to recreate or move here in the future.

Existence Values: The desire to leave an unspoiled planet to one's descendants, often a *bequest motive*, endows species or ecosystems with an existence value.

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Conclusion

In the present, the NorthMet Project is likely to be carried out. Before proceeding, I conclude that PolyMet Mining Corporation must consider the following:

- The Importance of Non-Market Values:** Considering the market values, but subtracting externalities and recognizing the extent scale and importance of the non-market values.
- Learn from the Past and our Neighbors:** Examining the history of sulfide mining and adopting a policy similar to the "Prove It First" law in Wisconsin. Prior to opening a mine, a company must be able to point to a similar mine that a.) has operated for 10 years without polluting and b.) has been closed for 10 years without polluting.
- Accountability:** Maintaining strict enforcement of water quality standards and upholding PolyMet Mining Corporation to meet these standards, thus preventing the mine from becoming a Superfund Site.
- Extractive → Attractive.** Investing in local economies such as telecommunications, housing, recreation, healthcare and Senior retirement communities to stimulate amenity migration.
- Changed Attitudes, Informed Choices:** Recognizing the need for a changed attitude towards the environment, the relationship between economic growth and its impact on the environmental and finding ways to value the ecosystem goods and services without monetary figures to enhance informed, consumer choices.

Through my research, I have come to the conclusion that the best way to place a fair, economic price on the future, intangible benefits of environmental goods and services in a realm where market prices rarely exist, requires a holistic perspective and interdisciplinary approach. Each situation is case specific and thus the valuation techniques applied should fit the circumstances. Both the benefits and costs must be weighed, with a specific focus on the non-market values and alternative solutions considered. Ultimately, PolyMet Mining and consumers alike will have to rethink the value that is currently placed on ecological goods and services as the dictates the future of the environment.

Methods

I began with conducting a literature review of the preexisting material in the field of environmental economics. I looked at 3 case studies of authors who assessed the value of environmental goods and services such as the value of Tropical Rainforests, National Parks, and the entire world's ecosystems and natural capital. The authors used various economic valuation techniques such as what consumers are Willing To Pay for an environmental good or service and a Cost-Benefits Analysis. From these case studies, I concluded that the process of placing a monetary price on intangible environmental entities is very difficult as each study is case-specific and many of these goods and services are not found on the market. I pulled various elements from the case studies to construct my own economic valuation of the NorthMet Project. The table above summarizes my valuation.

Removing any monetary figures and focusing simply on the importance that these entities should be given, the Environmental Costs clearly outweigh the Economic Benefits. These costs are the values that PolyMet Mining Corporation does not adequately take into account. The monetary values were obtained through the following methods:

Economic Benefits: Addition of Tax Revenues and Payrolls obtained from PolyMet Mining Corporation. The market values of the precious metals extracted from the NorthMet Project [copper, nickel, cobalt, platinum, palladium and gold] must be considered, but I did not include these figures into the total summation. At the very minimum, one must subtract the costs of developing the mine, extracting the mineral, processing the ore, refining the metal, transporting it to the market and most importantly the externalities imposed upon the environment and society. Mining Companies primarily focus on the economic benefits, often overlooking these externalities that manifest themselves in the form of non-market values.

Environmental Costs: Procured through various indirect valuation techniques such as travel costs for tourism and recreation, unknown and therefore unrecognized land values, costs obtained from NorthMet's DEIS predicting 2000 years of watershed pollution, an applied Willingness to Pay model for the working population of St. Louis County, and non-quantifiable Existence Values. These valuations are ridden with assumptions and variables, yet the overall valuation does provide greater understanding of all the non-market factors to be considered and weighed appropriately. All the figures must be considered *minimum estimates* as human existence ultimately depends upon the environment.

Sources

Dixon, John A., and Paul B. Sherman. *Economics of Protected Areas: A New Look at Benefits and Costs*. Washington, D.C.: Island Press, 1990.
Friends of the Boundary Waters Wilderness. "Sulfide Mining." *PolyMet Mining. Modern Mining*. [Hoyt Lakes, MN, 2012].
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