

UNIVERSITY OF WISCONSIN  
WHITEWATER  
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# TAINTER LAKE & LAKE MENOMIN

THE IMPACT OF DIMINISHING WATER QUALITY ON VALUE



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**T**ainter Lake and Lake Menomin are two impoundments (lakes created by damming a portion of a river) in the lower portion of the Red Cedar River.

Lake Menomin is located just north of the City of Menomonie, Wisconsin; Tainter Lake is located on the Red Cedar River at the confluence with the Hay River just a few miles upstream. The intrinsic nature of impounded lakes is that they trap sediment carried downstream by the river they are located on. This sediment often carries whatever has been eroded or washed off the landscape farther upstream. Therefore, these “man-made” lakes tend to suffer more water quality problems than similar natural lakes due to the modification of their natural hydrology and change in their natural ecology.

Tainter and Menomin both suffer from severe and often toxic Blue Green Algae blooms driven by high watershed loading of nutrients. These Blue Green Algae blooms are thick, putrid, and create poor water clarity, making it extremely difficult to fish and enjoy recreational activities during the summer months. In consideration of this issue, it is the goal of this analysis to determine whether the value of the lake property has kept pace with properties on competing lakes within the same market. Therefore, this analysis will examine differences in lakefront property values on Red Cedar Lake, Prairie Lake, Chetek Lake, and Beaver Dam Lake.

## A HEDONIC ANALYSIS OF TAINTER AND MENOMIN

To compare how different lakes influence the values of their respective properties, we turn to hedonic analysis. The premise behind a hedonic analysis is the idea that seemingly homogenous items, such as housing units, are actually comprised of many differentiated components. This type of analysis is used to estimate the contribution of each these individual components has to the overall value of the dwelling unit both implicitly and explicitly.

We aim to isolate the effect of a change in lake water quality on the value of these properties. Through the inclusion of properties located on several similar, yet unique waterfronts, we may test whether the value of the Tainter Lake and Lake Menomin properties have been able to keep pace with competing lakes despite the persistent eutrophication problems.

Using a hedonic analysis allows us to take observations on housing values and specific real estate characteristics (i.e. bedrooms, square footage, bathrooms, etc.) to obtain implicit prices for these individual elements. The market for single-family housing units is not determined by a supply of homogeneous homes, but rather by these differentiated components. Therefore, the valuation of these individual housing characteristics is intrinsically important in order to determine the overall value of these lake area properties.

Empirical research that attempts to value the implicit price of water quality in residential housing is limited. However, literature utilizing hedonic valuing techniques in real estate is copious. Estimating the value of these specific real estate characteristics is desirable and obtaining the necessary data is manageable. These explicit parameters of the demand function are quite useful, and the same information on implicit parameters is just as vital. This is particularly true for shoreline valuation because the lake quality characteristic contains the nature of this public good, and this data is not readily available except in implicit markets.

## DATA FOR THE HEDONIC ANALYSIS

Data was compiled using real estate transactions primarily in Dunn and Barron counties between 1999 and 2010. The properties included were randomly chosen from all homes located on Tainter Lake, Menomin Lake, Red Cedar Lake, Beaver Dam Lake, Chetek Lake, and Prairie Lake areas, as well as including non-lake homes in the cities of Menomonie, Elk Mound, and Rice Lake, WI. The inclusion of properties on non-lake homes helps to provide a comparison real estate market without lake frontage. A number of explanatory variables are also included in the hedonic regressions to capture the factors that are typically found to influence residential property values.

A total of 3,186 real estate transactions

were included in this hedonic analysis to determine the effect of diminishing water quality on property value.

## HEDONIC MODEL RESULTS

In reference to the hypothesis of diminishing value due to poor lake quality, both Tainter and Menomin are significantly behind lakes of similar qualities relative to non-lake City of Menomonie properties. Tainter Lake's shoreline per foot is well over \$100 less than the next comparable lake (Prairie). Lake Menomin's situation is even worse, indicating that shoreline per foot (\$150.75) is almost \$400 less than Prairie Lake and shoreline is roughly \$250 less than on Tainter Lake.

This suggests that due to increased eutrophication problems faced by these impounded lakes, property values have not kept pace with lake property of similar qualities.

This analysis has shown that the severe eutrophication problems plaguing both of these impounded lakes has resulted in financial harm to homeowners and the residing community that is dependent on their wealth as a tax base. This analysis has also confirmed our original hypothesis that Tainter and Menomin lake properties have experienced below market returns which can be attributed to severe pollu-

tion problems and subjective public knowledge of these events.

## IMPLICATIONS

There are an estimated 172 properties with shorelines on Tainter Lake and 142 on Lake Menomin. In 2009, the equalized value of all property located in the City of Menomonie was \$925,757,000, which generated tax revenues of \$22,850,448. If the value of shoreline on Tainter and Menomin approached that of its comparable regional lakes, it is reasonable to anticipate higher equalized valuation for the community.

### COMPARING PREMIUMS

Red Cedar	\$1,303
Beaver Dam	\$986
Chetek	\$832
Prairie	\$537
Tainter	\$414
Menomin	\$159

Comparable lakes have frontage values ranging from \$832 to \$1303 per foot. Improving lake quality for both Tainter and Menomin to these frontage values would increase property values and subsequently reduce property taxes by holding tax revenues at a constant level. By increas-

ing property values on Tainter Lake and Lake Menomin to comparable frontage values of other lakes may reduce taxes from between \$37.96 and \$70.56. Increasing the quality of the lake is important for lakefront property owners for appreciation purposes, but also for reducing property taxes on Tainter and Menomin without changing the tax base for off-lake homeowners.

## THE IMPACT OF PART TIME RESIDENTS ON THE LOCAL ECONOMY

Part-time residents on Tainter and Menomin contribute a certain level of money to the local economy, ultimately supporting a certain number of area jobs. In this section we aim to quantify the economic impact seen by spending from part-time residents and argue that increasing water quality extends the stay of these residents, leading to an increase in their economic contribution to the region.

Our public policy survey asked all respondents to report the “average amount of money your household spends in the county in which this property resides.” This question was followed by a list of thirteen separate expenditure categories. Ultimately, through the use of IMPLAN, these questions offer insight into the economic impact of the casual or part time visitor to the region.

This spending provides the owners of resources (individuals who supply time and labor, land owners, etc.) with additional income, a portion of which is spent on further goods and services in the Red Cedar Watershed area in further rounds of spending.

The impact of receipts and expenditures of the part time resident attracted to these lakes is felt throughout the entire local economy. Mortgage payments, grocery bills, and new cars are all affected by expenditures made by property owners as well as lake visitors. This results in the revenue of banks, supermarkets, car dealers, etc. The second largest expenditure category was “Shopping - General”. Following in order of magnitude were “Gas/Oil for Vehicle(s) and Boat(s)”, “Groceries”, and “Medical Care”. The mean expenditure data represent our best estimates of the annual average direct expenditures

per family among Red Cedar Watershed property owners. However, direct expenditure numbers are only the starting point to estimate the total economic impact from Red Cedar Watershed resident spending.

In IMPLAN, the linkages between sectors within the regional economy can be measured using multipliers.

While we use three types of multipliers in this analysis, we present a brief explanation of one (the expenditure multiplier) to illustrate this concept. Multipliers are composed of direct, indirect, and induced effects. The direct effect occurs in the first round through the direct expenditures of households and visitors. The indirect and induced effects focus on how the direct expenditures cause a ripple effect, which lead to additional spending in other sectors of the economy.



Analysts use the multiplier to describe and quantify the relationships, or linkages, between a region's various economic entities within. Multipliers describe these relationships using several different economic indicators such as industry output, personal income, and employment. This study uses the three indicators most commonly used in economic impact analysis: total expenditure, employment, and personal income.

Total expenditures provide a measure of total economic activity that is occurring within a specific sector as well as how it relates to total economic activity in the region. Similarly, employment estimates provide an evaluation of the number of jobs in a sector or specified sub-sector of the economy. Finally, personal income, defined as the wages, profits and other types of earned income, provides an indication of employee earnings attributable to a particular sector of the economy.

## ECONOMIC IMPACT ANALYSIS

The lakes are an important component of the local economy. The presence and economic activity of the part time residents is an important contributor to the overall economy of the surrounding areas. It is critical to recognize that Red Cedar Watershed has low water quality;

yet it is a positive force in the economy. In total, economic activity associated with property owner spending results in approximately 24 jobs and \$693,350 in labor income.

The economic impact provides insight and an opportunity to the community. In the study, it was determined that 50 percent of the residents used their homes fewer than 50 days per year. While this may be a reflection of the busy lifestyle and demands on time these families have, it is not unreasonable for the community to strive for greater participation by this group. Since the IMPLAN numbers only evaluate these part time residents, increasing the time they spend in the Red Cedar Watershed could offer some economic stimulus to the surrounding areas.

Prior research by the FERC has shown that improving water quality is a cause

for part time lake owners to use their property more. The center determined that in response to the control of Eurasian watermill foil. Part time residents on Delavan Lake would increase their use of their lake property by 5.12 percent. This research can also be applied to the Red Cedar Watershed area. If part time residents spend additional days at their lake properties, additional money would be spent. This money would create a marginal increase in expenditures, labor income, and employment.



## CONCLUSION

Poor water quality in Tainter Lake and Lake Menomin creates a tremendous cost to the surrounding area. The lakes present a great opportunity for Menomonie in economic terms; improvements in water quality lead to higher property values, increased economic activity, and ultimately more jobs. Aside from the economic advantages of clean lakes, there are countless and less tangible benefits to the community. Clean lakes can trigger a greater sense of pride in the area, and the community can become more cohesive with events motivated by its rediscovered natural resources. Restoring Tainter Lake and Lake Menomin means economic and community prosperity for Menomonie.



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