

## **The Greening of a Brownfield: A Community-Based Learning Project in Economics**

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### **Abstract**

This paper describes a community-based learning (CBL) project involving the economic redevelopment of two environmentally contaminated former industrial sites or "brownfields." The study was conducted over four semesters by several economics classes and involved assembling a database, measuring the impact of the brownfields on residential property values, proposing a redevelopment plan, and estimating the benefits of the environmental remediation and economic redevelopment of the sites. This CBL project provided economics students with a valuable opportunity to engage in a real-world economic analysis of a significant local issue.

### **Introduction**

Since the mid-1990s, the University of Wisconsin–Parkside has been striving for greater university engagement in the community. During that period the campus's administration and faculty reevaluated its role in building collaborative relationships between the university and private, public, and nonprofit organizations in southeast Wisconsin. The university formally incorporated engagement into its mission statement, conducted an exhaustive inventory of faculty expertise and interests in community engagement, augmented its campus-wide committee structure to include an Engaged University Council, and committed financial resources to encourage community-based learning in its courses. The U.S. Department of Housing and Urban Development advanced these efforts when it awarded UW–Parkside a sizeable, multiyear grant to cultivate university-community partnerships and establish outreach programs and community-based learning projects. The UW–Parkside Center for Community Partnerships (CCP), and later, the Institute for Community Based Learning (ICBL), were created under the auspices of this grant. The CCP and ICBL together have been responsible for initiating and implementing a variety of programs and projects that engage

the university in community issues, utilize university resources and expertise to help solve real-world community problems, and provide valuable learning and teaching experiences for students and faculty. The community-based learning (CBL) project described in this paper exemplifies one of the efforts undertaken by UW–Parkside faculty under the auspices of the ICBL. This project produced a number of pedagogical benefits for both economics students and faculty. In particular, because the project focused on a pressing community issue, economics students learned firsthand that abstract economic theories and models can be applied to real-world problems and can yield results that affect peoples' lives.

### Origins and Motivation of Project

The specific impetus for this CBL project was a request from the City of Kenosha, Wisconsin, and community leaders in the Lincoln Neighborhood, a demographically diverse neighborhood located in the central core of Kenosha, for assistance in addressing the environmental and socioeconomic issues surrounding two former industrial sites, or "brownfields", and their economic redevelopment. What emerged was an interdisciplinary community-based learning and teaching effort that lasted more than two years and involved five course offerings in three academic disciplines. Over four semesters, students in an environmental studies course, a sociology course, and three economics courses (environmental economics, econometrics, and managerial economics) made significant contributions to the

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project. Direct student engagement in the project, in fact, continued beyond what was immediately necessary to meet the community clients' needs for a timely report. Students in these courses produced a set of reports discussing (1) the types and levels of environmental contaminants (as determined by the Wisconsin Department of

Natural Resources and the U.S. Environmental Protection Agency) and the associated health risks of the contaminants found on the

sites, (2) a mechanism for disseminating appropriate information to the community and responding to community concerns and feedback; and (3) an analysis of the costs and benefits of the environmental remediation and economic redevelopment of the sites. Obviously, city officials desired that any given level of cleanup and redevelopment generate sufficient property tax revenues to cover at least a reasonable portion of the associated costs. Of particular interest to the environmental economics and econometrics classes was the accurate estimate of the economic impact of a brownfield (an environmental disamenity) and a neighborhood park (an environmental amenity) on residential property values. The purpose of this paper is to describe the economics component of the CBL project and to discuss the impact the project had on students, faculty, and the community.

Once the city's request was received, the ICBL contacted several faculty members whose research interests and course offerings that semester could address the needs of the request. The Economics Department's initial response was somewhat dismissive because the semester had already begun and economics faculty and students were inexperienced with large community-based learning efforts. In particular, the students and professor of the environmental economics class were concerned initially about the uncertainty and hidden costs that may arise with such an extensive CBL project. Nevertheless, a sociology professor, whom many consider the campus CBL pioneer and who was involved in the initial discussions with city and Lincoln Neighborhood representatives, was able to enlist the participation of the Economics Department by proposing a multidisciplinary collaboration involving courses in environmental studies, sociology, and environmental economics, with each class being responsible for a well-defined component of the overall study.<sup>1</sup> To maintain interclass communication and collaboration, the classes would meet jointly for progress updates and to receive project information from such sources as the mayor of Kenosha, the city planner of Kenosha, and a local commercial developer. After evaluating and comparing the expected pedagogical costs and benefits and realizing that seasoned practitioners of community-based learning were collaborating in the project, the environmental economics class decided to participate in the study.

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<sup>1</sup>Anne Statham, Professor of Sociology and Director of the UW-Parkside Institute for Community-Based Learning, was in large measure the compelling force behind the coordination of initial faculty involvement in the project.

A well-recognized issue in CBL is the coincidence of traditional semester course offerings with the length of the project itself and needs of the community client. A fortuitous aspect of student involvement and course scheduling in this project was that several key students from the initial environmental economics class were also enrolled in an econometrics course taught in a subsequent semester by the professor who was already involved in the project as a technical consultant. Even though the environmental economics class completed and delivered a report to the city, the CBL project was incorporated into two subsequent courses, a managerial economics course and an econometrics course, and students continued their work by refining the data and applying more sophisticated models and statistical estimation techniques.

### The Economics CBL Brownfield Project

The Lincoln Neighborhood in Kenosha is a diverse, older, lower-income and working-class neighborhood in the central core area of Kenosha. The two brownfields, the 4.5-acre former Frost Manufacturing site and the 29-acre Outokumpu Copper/American Brass facility, are located in the center of the neighborhood (see Figure 1). Frost Manufacturing produced plumbing and swimming pool supplies from 1905 to 1994. The Outokumpu facility produced copper, bronze, and brass products from 1889 to 1999.

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The 44-acre Lincoln Park lies in the southwest portion of the neighborhood and offers a typical set of recreational activities. The residential properties, brownfields, and park all lie within close proximity of each other and so the residential properties of interest do not extend across clearly identifiable inner city—suburban boundaries.

To meet the city and neighborhood's needs, the economics component of the CBL project had two objectives. The first objective, which was the primary pedagogical interest of both the environmental economics and econometrics courses, was to

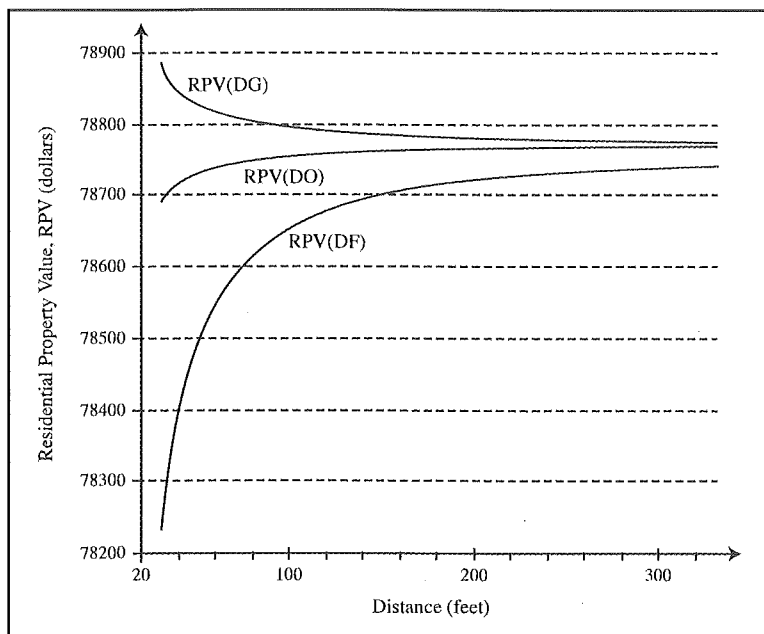
Figure 1



examine the economic impacts of the neighborhood park and the two brownfields. The second objective, which was the primary practical interest of the City of Kenosha, was to devise economic redevelopment plans for the two brownfields and estimate the economic benefits of these plans.

The impacts on residential property values were estimated using a hedonic pricing regression model, which is a statistical tool applied to an economic theoretical framework that is able to estimate the effects of an independent variable (proximity to a greenspace or brownfield) on a dependent variable (property values), while controlling for the impact of other housing characteristics. Economic theory states that the market value of residential property is based on the various characteristics of the housing unit along with "neighborhood effects." In particular, the external effects of an environmental amenity or disamenity (such as a greenspace or brownfield) are capitalized or reflected in the market value of nearby properties. In other words, a home buyer is willing to pay less for a house located near a brownfield than for a house located near a city park, holding all other factors constant. The hedonic model examined almost nine hundred residential properties within the Lincoln Neighborhood. Individual house characteristics for the hedonic model were obtained from

Figure 2



In Figure 2, the function  $RPV(DF)$  shows the increase in the residential property value of the representative house, which is assumed to have average characteristics, as the distance increases between the Frost brownfield and the house (DF). Similarly, functions  $RPV(DO)$  and  $RPV(DG)$  show the change in property value as the distance increases between the representative house and the Outokumpu brownfield (DO) and the greenspace/park (DG), respectively.

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property assessment data, which was provided by the City of Kenosha Assessor's Office. The hedonic estimates yielded property value gradients as exhibited in Figure 2, which illustrates how the value of a representative property will vary with distance to one of the brownfields or the greenspace/park. The functions illustrated in Figure 2 were then used to determine the overall impact on property values of the brownfield areas; that is, the students estimated what property values would be if the brownfield were not present. It was determined that remediation and the elimination of the brownfields would add \$1,897 to the average property value, increasing residential property values by a total of \$2.73 million for the entire neighborhood.

The process to devise a viable redevelopment plan first began with a survey of recent brownfield remediation and redevelop-

ment projects in Wisconsin and Illinois. Students then examined a variety of land use possibilities for the two Kenosha brownfields and the levels of environmental remediation that those uses would require (for example, land for single-family homes must meet higher environmental standards than land for commercial businesses). A number of alternatives were considered, ranging from building a sports complex or a nine-hole golf course to rehabilitating the existing facilities and creating an "incubator" zone for high-tech startups.

After meetings with neighborhood block captains, the local city alderman, and a commercial developer to discuss the neighborhood's needs and wants, it was determined that the Outokumpu redevelopment plan should include affordable residential housing on the eastern 18 acres and a neighborhood grocery store, large community center, and several basic retail businesses on the western 11 acres. The commercial component would provide employment opportunities, particularly entry-level jobs, for neighborhood residents. The residential component would contain a mix of new residences, primarily single-family homes, and the conversion or "adaptive re-use" of several existing architecturally interesting or historic structures into condominiums and apartments.

The economic benefits of the redevelopment of the brownfields were estimated in terms of city property tax revenues (current nominal revenues and real present values of future tax revenues), job creation, and income generation. Data used for these estimates were obtained from various sources, including the U.S. Environmental Protection Agency (EPA), U.S. Department of Housing and Urban Development (HUD), U.S. Census Bureau, State of Wisconsin Department of Commerce, State of Wisconsin Department of Natural Resources, and the City of Kenosha. The students determined that the present value calculations of projected tax revenues yielded significant revenues. The students concluded that as long as the city's (and county's) expenditure on the cleanup and the construction of infrastructure (roads and water, electrical and sewer service) was less than \$4.8 million, the net benefits would be positive, and remediation and development would be warranted.<sup>2</sup>

The environmental economics class finished the project by preparing a final report and giving a series of presentations to the

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<sup>2</sup>A full report of the hedonic model estimation and the economic development plan is available from the authors upon request.

mayor, other city officials and representatives, residents of the Lincoln Neighborhood, and the general public. Several presentations were covered and written up by the local newspaper. The report from the environmental economics class concluded with the following statement:

To determine the "best" level of environmental remediation and redevelopment of the Frost and Outokumpu brownfields (i.e., the level that is socially efficient and maximizes net social benefit), total social benefits and total social costs must be projected. Generally, the social costs of achieving given clean-up standards are incurred immediately (within several years), are relatively easy to predict and are financed by the present generation of taxpayers. The social benefits, on the other hand, will usually be generated over many years, if not decades, and will be enjoyed by future taxpayers. The intergenerational dimension of environmental choices makes challenging economic problems extremely interesting but very difficult to solve.

#### The Payoff: Student/Faculty Learning and Community Benefits

Because the project deviated significantly from the content and responsibilities in a traditional semester offering, this CBL experience presented a number challenges to both students and faculty. Nevertheless, formal and informal feedback gathered subsequent to the completion of the report from students, faculty, and the community clients has shown that the project had a significant impact on learning for students and faculty and contributed to the community awareness and understanding of the economic and environmental ramifications of the brownfields' remediation and redevelopment. The study's influence on the decision making of city officials was difficult to ascertain with any certainty because the city solicited input from a number of sources, including professional development consultants. Nevertheless, the community meetings and presentations provided a forum through which residents were heard and the needs and desires of the neighborhood discussed. Notably, the brownfields were a local issue at the same time that most of the city's attention was directed toward a multi-million-dollar "marquee" redevelopment project along downtown Kenosha's lakefront (on the site of a former American Motors/Chrysler car assembly plant).

While this was not the first CBL effort for the economics faculty, it was their first large scale community-based learning



project that involved both a tangible service to the community and intra- and interdepartmental collaboration. The project represented the first intradepartmental research collaboration effort for the economics department in the last twenty-five years. Because the UW–Parkside economics department is small, with five full-time positions, each individual faculty member has had to focus his or her teaching and research on relatively distinct subfields of the discipline. Community-based service-learning projects are frequently, by their very nature, interdisciplinary—and this applies to the subfields within a discipline as well. Thus, we were able to combine our expertise in the areas of microeconomics, managerial economics, econometrics, and urban economics. The ensuing intradepartmental dialogue and collaboration has led to subsequent faculty research projects and two coauthored scholarly manuscripts. In addition, the department has made a conscious attempt to expand the use of community-based learning in its course offerings. For example, the managerial economics course now requires a student research project that involves the analysis of an economic decision-making problem faced by a local business or nonprofit organization. Once the problem is identified (and simplified), the student collects and analyzes data using quantitative techniques, applies economic models, and produces a solution to the problem. The department has begun to keep copies of these student projects in portfolios for program review and assessment purposes.

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For the students, the project generated almost all the benefits for which we had hoped. First, purely academically, students were able to engage in a hands-on, real-world, applied research project from start to finish that addressed a tangible problem in their community—a rare opportunity in economics. In exit interviews students revealed that they found the project time-consuming and “pretty demanding,” but it made “learning much more interesting . . . by mak[ing] you tie together what you learn in the classroom and apply it to the real world.” Second, students recognized the

value of CBL projects to their career and vocational goals. Recent feedback from students who graduated and are now out in the workforce indicates that the project has been highlighted in their resumes and has been an integral part of their job interview presentation. As one student wrote, "it showed future employers that I could work with (and lead) a team to gather a large amount of information and present it in an informative manner to an outside group." Two of the graduated economics students, while accepting more traditional positions in local banking, nevertheless have entered those positions with a unique perspective on community service and the role the university can play in local economic development. Two other economics graduates have taken more service-oriented positions—somewhat unusual for our economics graduates. One of these graduates, after volunteering for a local neighborhood development group, took a position teaching inner-city youth, and the other student is teaching inner-city special needs children. Finally, the project changed students by giving them a gratifying experience and altering their view of service work and learning. One student wrote, "a rewarding aspect was the fact that we presented empirical proof to the Mayor of Kenosha to enable the City of Kenosha to make an educated decision as to what to do with the brown-fields." Another student was impressed with how the project "brought a lot of disciplines together for a common cause" and how "it helped me understand how many levels of participation are necessary for environmental remediation to occur, or any true community building project for that matter."

For the community clients, the City of Kenosha and residents in the Lincoln Neighborhood, the project yielded a valuable independent analysis that broadened their view of the Lincoln Neighborhood and enhanced their decision-making process. City officials expressed their appreciation for the students' contribution, and as one participant stated, "residents were thrilled that people were paying attention, and that such things were possible within their neighborhood." Even though we did not receive any written feedback from the city, we note with some satisfaction that the final redevelopment proposal formulated by the city had a remarkable resemblance to the plan put forth by the students. Overall, the students, faculty, and the community felt that the CBL project was a worthwhile experience and one in which the empowering effects of education were observable and tangible.

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## About the Authors

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