

Environmental Impact and Economic Assessments of Brownfield Sites in Park Heights Baltimore.

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Abstract:

This paper presents a collaborative research project that cuts across discipline (Civil engineering and Industrial, Information and manufacturing engineering) involving undergraduate and graduate student and a community association in Baltimore (The ParkReist Corridor Association) and at the same time meeting the mission of the university. The project involves an environmental impact and economic assessment of Brownfield sites in the Park Heights area of Baltimore. Brownfields are abandoned, idled or underutilized industrial and commercial properties where expansion or redevelopment is complicated by real or perceived contamination. Preliminary Phase I environmental assessment results indicate that both Brownfield sites display no evidence of contamination. The economic assessment results indicate that both the economy and the population are declining significantly. This decline will continue and even worsen for next few years if no redevelopment is implemented. Thus, it is important for the community to make a strategic plan of attracting more business and population back to the community, through a better utilization of the idle land under the Brownfield site redevelopment scheme. Statistical analysis is applied in the assessment. The results will be used for the baseline studies for future Brownfield redevelopment.

Introduction:

Morgan State University (MSU) is one of the one hundred and fourteen (114) historically black colleges and Universities (HBCU) in the country. It is the designated urban university in Maryland charged with the mission of providing a comprehensive array of programs and services to the citizens and organizations of the Baltimore metropolitan area. Its three major mission components are (1) to educate citizens from diverse academic and socioeconomic backgrounds, (2) to carry out research, giving priority to that applicable to the problems of the region and its residents, and (3) provide cultural opportunities for the region and offer programs of service to the community and the general public. MSU was founded in 1867 as a Centenary Biblical Institution by the Conference of the Methodist Episcopal Church to train men for the ministry. It became a public institution in 1939 when the state of Maryland acquired it for the purpose of affording its African- American citizens access to public higher education at a time when access

to this population sector was limited. Over the years, under committed and dedicated leadership, the University has seized the opportunity to develop MSU into a highly competitive educational institution which now possesses a national reputation for excellence in Science Engineering Liberal Arts and Business fields. Among its many achievements in support of this claim are that MSU

- Continues to graduate more African-American undergraduates in chemistry than all other State institutions combine.
- Awarded 10% of all the nations B.S. Degrees in Physics earned by African-American students, in the last 15 years.
- Enrolls over 60% of all the State's African-America engineering students.
- Graduated 100% of the United States' African-American majors in Physics.
- Largest producer of African-American engineers in Maryland and among the top ten Institutions graduating the highest number of Africa-American Engineers in the nation.
- Led all public institutions nationally (between 1986 –1990) in awarding bachelor's degree to African-American students who subsequently went to receive doctorates in their chosen fields of study.

The school of engineering was founded in 1984 and has graduated over engineers in electrical, civil and industrial disciplines.

This paper reports on a project that demonstrates the missions of the university in the execution of an interdisciplinary collaborative research project involving a local community based organization. The research was funded by the Interdisciplinary Center for Earth and Space Science Application Research ICESSAR, a center created with a grant to MSU by the National Aeronautics and Space Administration (NASA) with a mission of fostering interdisciplinary research in space science.

The problem:

According to the U.S. Environmental Protection Agency (EPA), a brownfield is a site, or portion thereof, that has actual or perceived contamination and an active potential for redevelopment or reuse [1]. Since 1993, EPA and other federal agencies have helped state and local governments to cleanup as well as redevelop brownfields. This assistance helps bring these areas back into productive use, providing the foundation for revitalization, job creation, and the restoration of hope in distressed neighborhoods. It also helps restore and protect green space in both urban and suburban areas by reusing already developed properties and by cleaning up contaminated sites. Brownfields can pose a significant health risk to those who live, play or work around them. Toxics from contaminated sites often leech into the soil, which, when stirred up by wind or human activity, can be harmful to inhale. Exposure to brownfields may contribute to various health problems. For instance, in Northeast Portland, where the majority of Portland brownfields are located, the percentage of residents with asthma and other respiratory illnesses is higher than in other parts of the metropolitan Portland City [2]. Other examples also include that according to the asthma assessment research conducted by NASA scientists [3], Park Heights community, the brownfield neighborhood of interest, has a higher asthma occurrence rate during the past ten years than other areas of the greater Baltimore Metropolitan. In addition, it is known that many

economically disadvantaged residents, most of whom are African Americans live in this community. In Maryland, both Baltimore City and State of Maryland have identified brownfield as a priority due to the emphasis placed by the current administrations on economic development initiatives. All of these efforts must, however, be discussed in light of economy. The fact is that Maryland's economy has been growing slowly but Baltimore City has not grown at all. The expected results of a brownfield overhaul must be tempered by the realities of the local economics [4]. The Park Heights Community trying to seize this opportunity, presented by the EPA's Brownfield Initiative, wanted to redevelop two brownfield sites in the area with the hope of revitalizing the neighborhood, thus decreasing migration out of the neighborhood and increasing the quality of life within the community. In order to take full advantage of the Initiative the Park Reist Corridor Coalition approached MSU school of engineering to perform an Environmental Site Assessment (ESA) and Economic Assessment of the area (Figure 1). These sites are to be developed into a community playing ground with tots lot, tennis and basketball courts and a mini golf course.

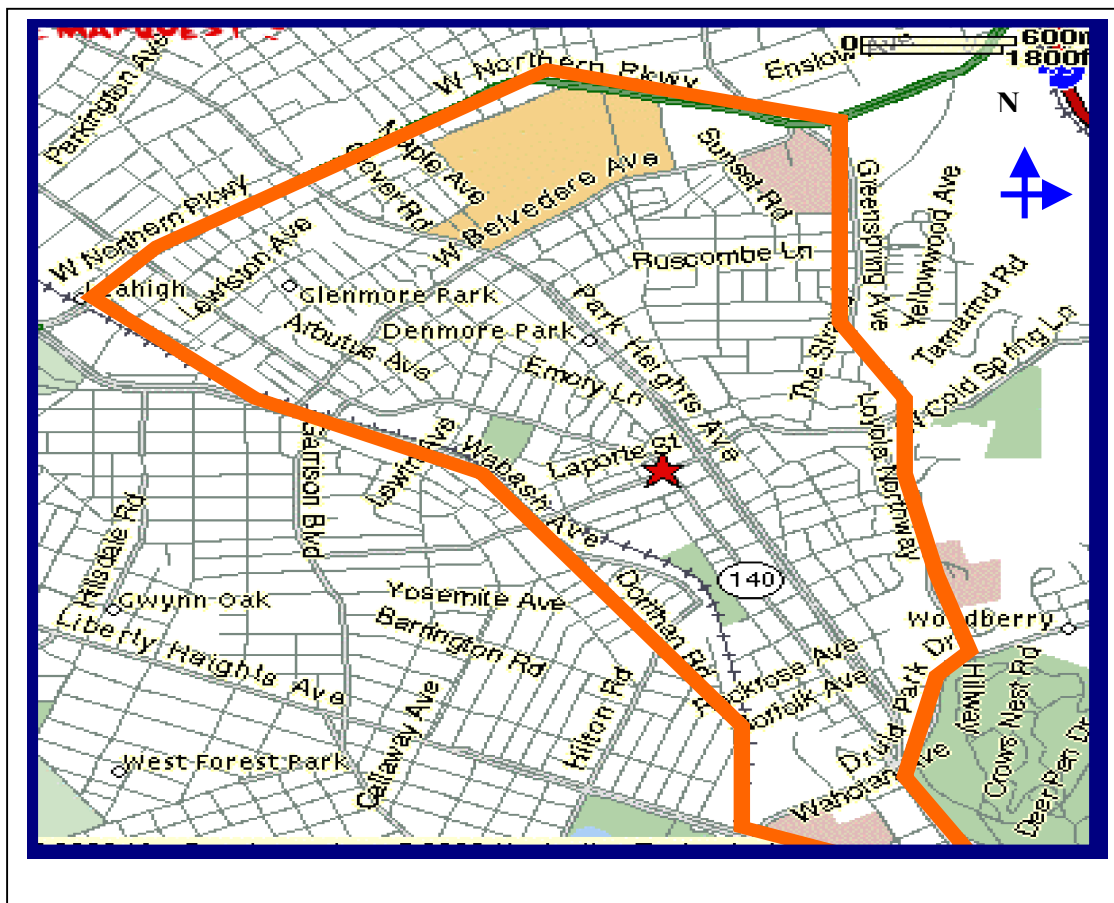


Figure 1. Park Heights community in northwest area of Baltimore City

Objective:

Brownfields assessment and redevelopment projects can encourage the interests of community groups, investors, lenders, developers, and other affected parties to address the issue of cleanup of the contaminated sites and the issue of preparing them for appropriate, productive use. The objectives of this project therefore were:

- To perform a phase I environmental assessment of these brownfield sites in order to facilitate the assessment for remediation of these sites, to enable recommendations for redevelopment and reuse.
- To sample the sites for the presence of contaminants in order to protect the developer/owner from prosecution for the presence of contaminants on the property and protect the public from health hazards posed by the contaminants.
- To perform an economic assessment of the sites studying the existing community's economy as well as its dynamic trend over the past few years, which includes current average property value, average household income, population change trend, as well as existing majority business.
- To adopt a team approach involving Morgan State University, a Maryland state environmental organization, and the Park Reist Corridor Coalition, in the redevelopment of the brownfields sites hereby developing a national model demonstrating the positive results of public and private collaboration addressing Brownfields challenges.

Project Team.

The project team included two faculties in the departments of civil and industrial engineering respectively and a research fellow in civil engineering, two graduate students in civil and industrial engineering respectively and two undergraduate students in civil engineering. In addition a geologist from the Maryland Department of Environment (MDE) also participated in the project.

Site Information

The sites under investigation are located in the northwest area of Baltimore City with a US postal zip code 21215. The district area is bounded primarily by Wabash Avenue (or CSX railroad) on west, Greenspring Avenue on east, Northern Parkway on north and Liberty Heights Avenue on south (Figure 1).

Site I, located on the odd-number side of the 4700 block of Reisterstown Road, is under consideration for redevelopment as a paved playground area for children and adults. Children's playground equipment, along with basketball rings, and other adult recreation/relaxation equipment such as tennis court were proposed. Site II, located on the even-number side of the 4700 block of Reisterstown Road, and is considered for redevelopment into a miniature golf course and driving range. The miniature golf course would have a turf covering, as would the golf driving range.

Background Information

There have been some crucial periods in Park Heights. A decade of declining population - 20 percent in some neighborhoods - and high crime rate has left many sections in this part of Northwest Baltimore scarred by vacant homes and empty storefronts. On top of that, city officials are considering closing two schools and a public library, as indicated in an article in Baltimore Sun newspaper [5]. Most of the residents in the Park Heights community are economically disadvantaged African Americans. Through our site visits, it has been observed that most properties around that area are townhouses. About thirty percent of them are abandoned and empty houses. There are numerous auto repair workshops in the community many of which are auto body shops that may have released contaminants into the ground. In addition to the possible land pollution, auto body painting operations produce air emissions mainly consisting of two types: volatile organic compounds and hazardous air pollutants. The Clean Air Act Amendments of 1990 and Maryland air quality regulations have restrictions on these air pollutants [6], although these regulations may not carefully be followed by these auto body shops. According to the asthma assessment research conducted by NASA scientists [3], Park Heights community is ranked high in the list of the areas with asthma occurrences during the past ten years in the greater Baltimore Metropolitan

Methodologies

An historical site assessment will determine whether or not any evidence of contamination can be found due to the past or present usage of the property. For instance, it can be an evidence of possible contamination that the commercial activities conducted on the property involve the hazardous materials. The presence of these hazards could become critical when the future usage of the site is taken into account. The results of historical assessment influence whether an ESA moves from Phase I to Phase. The following activities and approaches were used:

- Site visits -Park heights Brownfield sites were visited to collect data and observe the neighborhood environmental condition of the Brownfields;
- Contacts- Community development incorporation and Baltimore City Assessment Department were contacted for Baltimore archival information;
- Library and Internet search, as well as statistical analysis on the assessment results were performed. The information about the property value in Park Heights Brownfield area, household income distribution, as well as population changes, was collected.
- Baltimore City Hall was visited to collect information about historical assessment for the site.
- Statistical analysis, a random sample of household addresses was selected for economic analysis for gathering statistical information.
- Phone calls to Baltimore City Office for Real Property Assessment were also conducted to verify the data and our economic analysis.
- Computer software, such as Minitab and Statgraphics, were used to perform statistical analysis, including the mean property value, confidence intervals and histograms of the property value data, as well as the population information.

- Interviews of community members who have resided in the area for up and beyond 30 years are conducted. In addition, a review was made on various state and federal environmental lists that outline the presence of contamination on or near the property in question. This information was gathered from City Hall, the relevant state and federal agencies, as well as any community organizations in the neighborhood in question.
- Environmental Site Assessment (ESA) basically has two stages: Phase 1 and Phase 2. Phase 1 is a preliminary fact finding stage. In this phase the past, recent and future use of the property was investigated. The site was inspected visually. Physical features of the site were recorded. Environmental laws affecting the property's use were determined and the various state and national agency database were checked for reference to the properties within a one-mile radius. The second stage, Phase 2, is carried out only if the evidence gathered in Phase 1 indicates the presence of EPA regulated compounds. Phase 2 involves detailed pH of soil sampling, ground water checking and environmental testing of materials found within the area for the quantities of suspected contaminants. The ESA is concluded with an Environmental Impact Statement (EIS) summing up the findings of the ESA [8].

Results and Discussion

Historical Assessment

For the playground-candidate site (site I), according to interviews with the local residents, a BP gas station was operating there approximately twenty years ago but this could not be confirmed from city records because the city doesn't have data records about this information dating back twenty years. The concrete gas storage tank may be still under ground because we hit a concrete cap while taking the soil samples. However, it is not clear to us whether the tank is filled with concrete/earth or empty. The BP gas station owner was deceased and there was also a small grocery store on the corner of Reisterstown Road and Lucille Ave.

For site II to be developed into a miniature golf course,

- The area of the golf course bordering Reisterstown Road was the site of an auto dealership and a glass company; along with a few other small businesses.
- Larry's Dodge was the auto dealership. However, the dealership did not have any auto-body work done at that time (or at least not on a massive scale).
- The Glass business was B&B Glass. The business abandoned the site after the city decided to develop the area into a playground for kids, approximately 30 years ago.
- Interviewees indicated that Larry's Dodge was relocated to Timonium, MD.
- The general park area was utilized as a Little League Park prior to its present use as a non-specific park area with a playground attached.
- Separated area residents, residing in the area for 24 - 34 years, supplied all information on past uses of the properties.

Environmental Site Assessment

According to the results obtained when the two sites were investigated, Site I, and may be classified as a Brownfield site due to its prior development and possible contamination by gasoline (especially leaded gasoline over 20 years ago). Preliminary analysis indicates that the ground surface of the old gas station was completely capped over with concrete/cement material for reclamation. The cap surface is further covered with soil to depths ranging from 0 cm to approximately 15 cm. This soil material is adequate in some areas to support grasses and shrubs, while in other areas the capped material is exposed. In addition, the pH of soil samples was collected to determine the possible chemical reactions that could occur if certain contaminants are present. The pH values were slightly acidic, varying from 6.3 –6.9 and percent organic matter varied from 4.1 to 7.0 (Table 1). This high organic matter content is not natural for this area and is conclusive evidence that soil and plant materials were brought in for reclamation. The method of organic matter determination was by Loss on Ignition (LOI) (Methods of Soil Analysis-American Society Scientists 1997).

Site II is a grassy park with a paved portion that separated from the grassy park by boulders. The paved portion has children's playground equipment that appears rusted and antiquated. According to the community members interviewed, the playground area of site two used to house a Dodge dealership, a glass company, and a convenience store prior to its utilization as a playground thirty years ago. The Dodge dealership may have repaired or serviced vehicles as well. The classification of Site II is not straightforward. The majority of Site II, everything but the paved playground area, has always been exposed parkland, and hence may not be classified as a Brownfield. On the other hand, the playground portion of the park was once utilized commercially but has (since thirty years ago) been redeveloped into the playground area that exists today. There is no strong evidence suggesting site II (on its own) has been contaminated. Lead concentrations in uncontaminated soils usually range from 2.0 to 200 mg/kg [9]. Elevated lead concentrations have been reported in many soils resulting from anthropogenic activities. Generally, soil is considered "contaminated with Pb" when the total Pb concentration exceeds 300 mg/kg [10] and remediation is recommended when the total Pb concentration exceeds 400 mg/kg [11]. Samples of soil and vegetation were taken from representative locations at the site. Soil analyses conducted were tests on pH values, percentage of organic matter and extractable lead (Pb). Soil lead extraction was conducted based on the method of R. G. Burau [12] with 0.1 N HCL. In research conducted by the author he found good correlation between lead extracted from soils and the amount added by anthropogenic methods. Total lead was also determined on the vegetation after dry-ashing and being dissolved in 0.1 N HCl. In cases, (soil and vegetation) analysis was by Atomic Absorption. Lead extracted from the soil samples was less than 30 ppm (see Table 1), and in all instances, the lead extracted from the vegetation was below detection limits. Depending on the geography and geology of the particular region, in this case, this region of the U.S., soil-Pb content may vary from 50 – 100 ppm. Without being suspected of being contaminated.

Table 1. Results of soil testing for pH and Pb (A = 0 – 15 cm and B = 15 – 22 cm)

Soil Samples	pH	Pb ppm	% Organic Matter
1 A	6.3	24	4.8
1 B	6.3	26	2.9
2 A	6.9	21	5.4
3 A	6.6	20	4.2

Table 2. Present or past usage of properties around the two sites.

Address	Past Usage	Present Usage	Possible Contamination
4701-4713 Reisterstown Rd (Site I)	*British Petroleum Gas Station (closed in about 1974, between 1971- 1976)	Abandoned lot (1974 – Present)	Yes (underground storage tank, UST)
4700-4740 Reisterstown Rd (Site II)	Commercial Activity (? - 1976)	Little League Park (1974? – Present)	No
4715-4725 Reisterstown Rd	Residential	Abandoned	No
3600 Woodland Avenue		Bar	No
3604-3606 Woodland Avenue	Insulation storage (? – 1999) Auto Repair Shop (1999 – 2000)	Auto-body Repair Workshop (1980 – Present)	Yes
3608-3612 Woodland Avenue		Parking Garage (2000 – Present)	Yes
3620-3622 Woodland Avenue		Insulation Storage (? – Present)	Yes
4600-4700 East Wabash Avenue	Derby Steel Co. (1980 – 1992) Steel Fabrication Shop (1992)	Storage Warehouse (1993 – Present)	Yes
4707 East Wabash Avenue		Little League Park (? – Present)	No
4715 East Wabash Avenue	Candy Company Steel Fabrication		Unclear

Economic Assessment

Brownfield redevelopment is a multi-dimensional subject. One of the underlying themes for the compact growth strategy is to maintain and increase economic opportunities, as well as a mix of incomes, in the region's older neighborhoods. These neighborhoods are home to a disproportionate number of Brownfields in the area. Economic assessment and redevelopment can return these lands to productive use, offering potential housing, employment and entrepreneurial opportunities to community residents. Productive use also returns properties to the tax rolls, providing a ripple effect on the local economy and boosting adjacent property values.

The cleanup and redevelopment of old brownfields sites can provide us with a wonderful opportunity to preserve our past and create cultural and economic opportunities for future generations. Community development is both a process and a program. It seeks to develop the citizen's ability to identify community programs, set goals, encourage liaisons with outside agencies, stimulate community interaction, and bring groups together to respond to a wide range of economic development, human resource development and quality of life. Brownfields cleanup and redevelopment is often driven by location and market conditions.

By doing the economic assessment on brownfield at Park Heights Reisterstown, the basic information about the existing business and population, including the household income distribution in this area before the redevelopment were revealed. Through the assessment, we can also determine the economic investment opportunities for redevelopment. The current household income data for the zip code 21215 are shown in figure 2. The bar chart gives the percentage of the household income in different dollar ranges. The data is based upon the assessment on the income in 1999 [13].

It can be observed that in Park Heights community, about 23% of the household income is less than 15K, 17% of the household income is between 15K to 25K, 34% of the house income is between 25K to 50K, 22% of the household income is between 50K to 100K, 3% of household income is between 100K to 150K and about 0.9% of household income is greater than 150K.

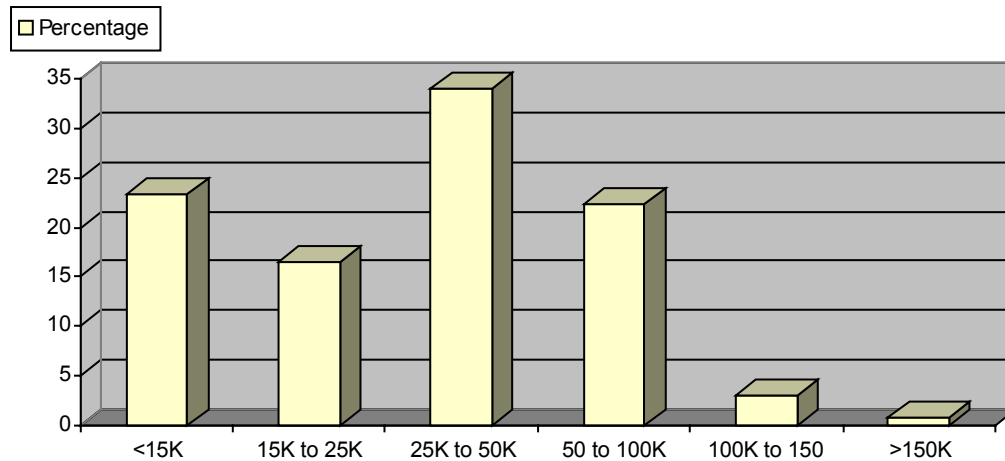


Figure 2. Household Income Distribution in Bar Chart

In addition to our observation on the fact that many townhouses are abandoned and empty, another vital sign of economy depletion is the decreasing population over the past 10 years. As shown in figure 3, the population decreased significantly through the years. Similarly the number of household also decreased significantly (Figure 4). The household income distribution and population was compared with other areas in Baltimore City such as zip code 21209, 21210, 21211 and 21212 etc. Though with smaller population, the household income profiles in these zones present higher values (Fig. 5- 9). Comparing the Park Heights data with the suburban area such as Towson and Pikesville in Baltimore, the difference is very significant. It is evident that the populations in these areas have increased since 1990 and the increase is predicted to continue to 2004. These area's household income profiles display a much higher number (Figure 10 and 11). As a result, we can conclude that the Brownfield economic redevelopment is vital in Park Heights Reisterstown in order to bring the population and business back. It is urgent for the governmental agencies and the community to work together, to make a strategic plan to increase resident retention and stimulate business opportunities through providing more economic, environmental and social benefits to this urban community.

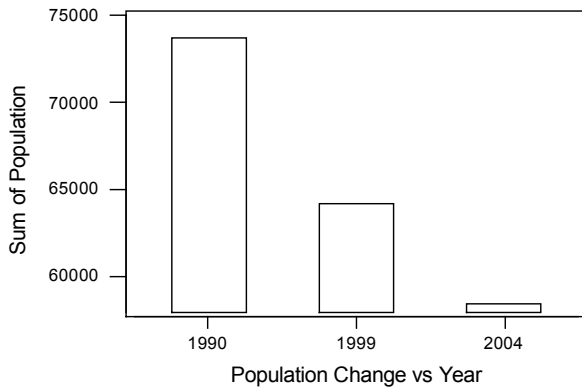


Figure 3. The declining and predicted declining population of Park Heights.

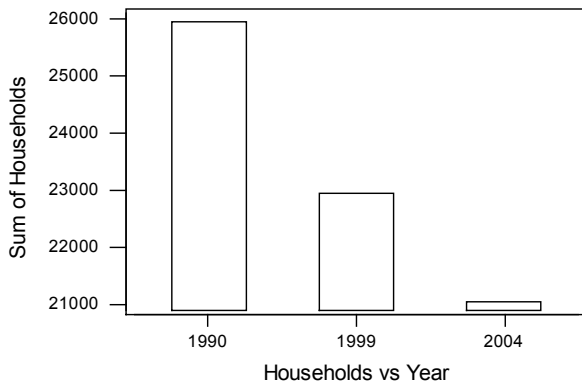


Figure 4. The declining and predicted declining number of households in Park Heights.

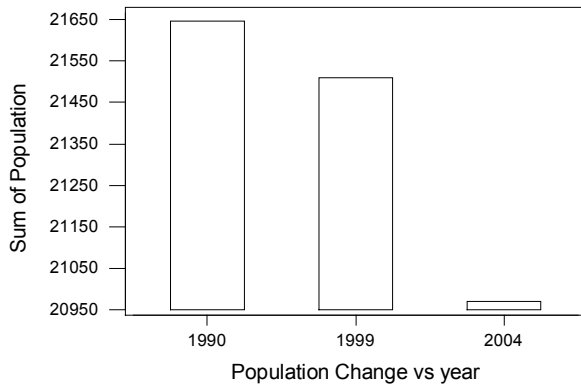
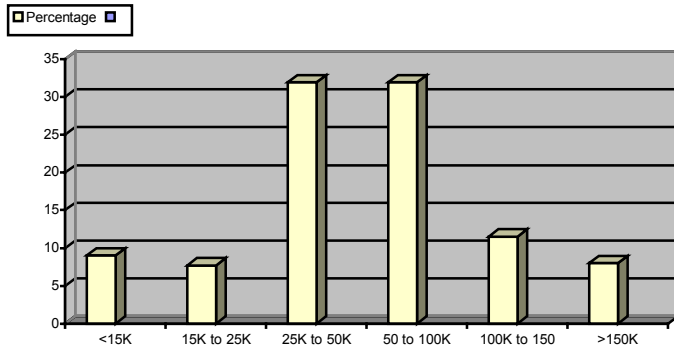


Figure 5. Household Income Distribution and Population Change Trend versus time based on Zip Code 21209 in Baltimore.

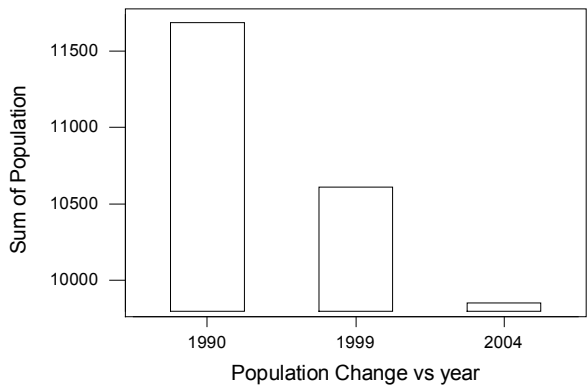
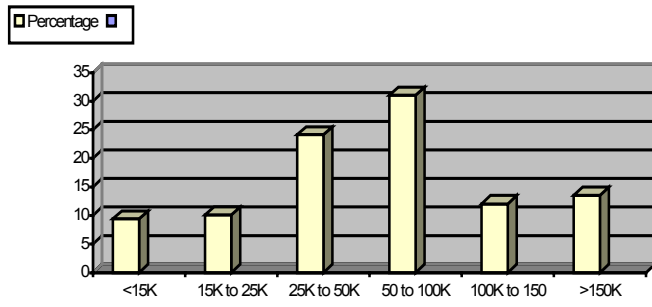


Figure 6. Household Income Distribution and Population Change Trend versus time based on Zip Code 21210 in Baltimore.

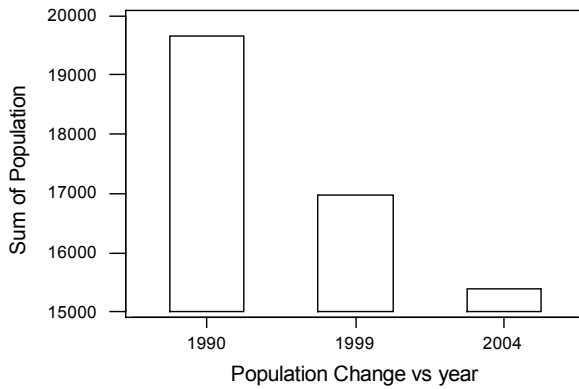
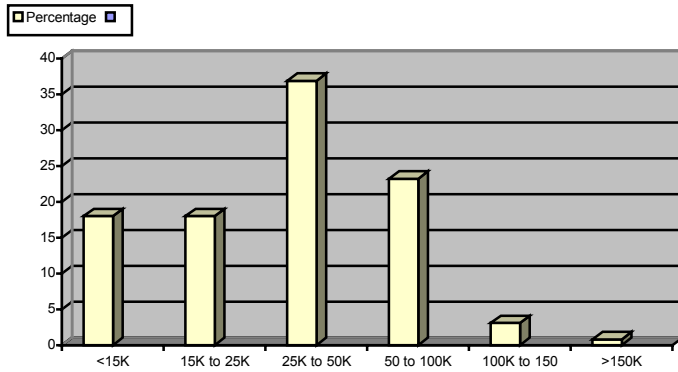


Figure 7. Household Income Distribution and Population Change Trend versus time based on Zip Code 21211 in Baltimore.

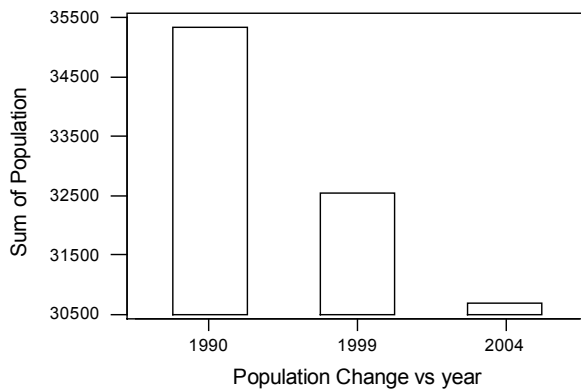
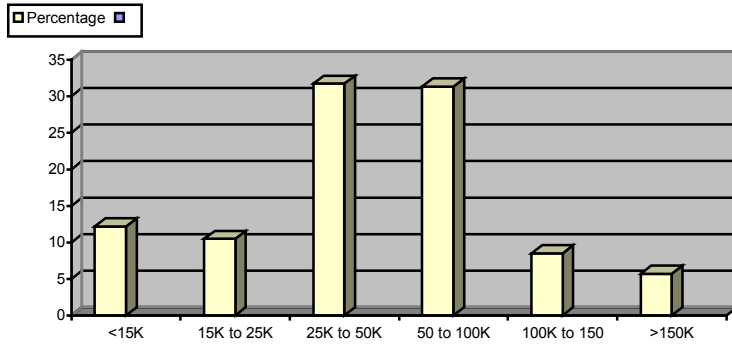


Figure 8. Household Income Distribution and Population Change Trend versus time based on Zip Code 21212 in Baltimore.

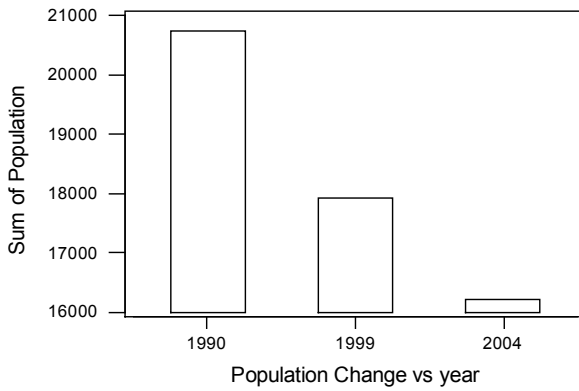
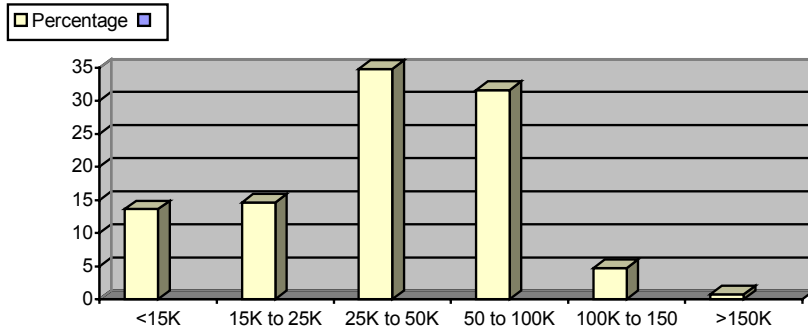


Figure 9. Household Income Distribution and Population Change Trend versus time based on Zip Code 21214 in Baltimore.

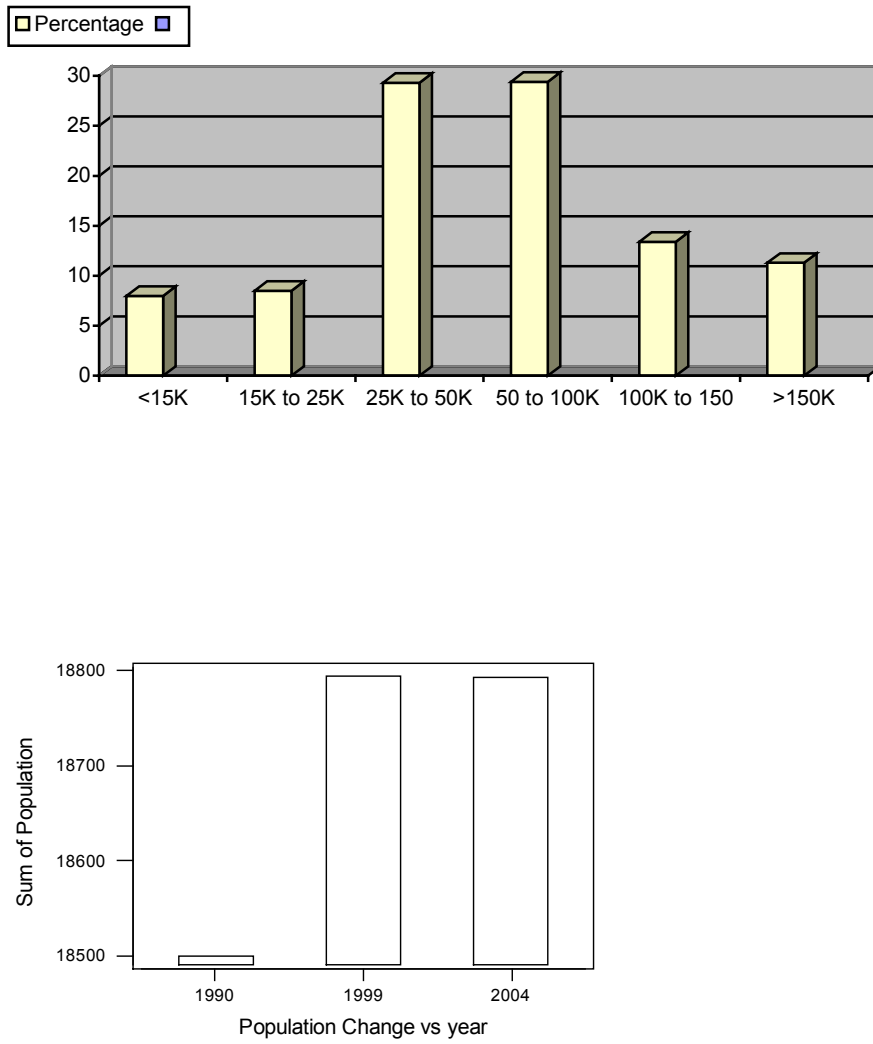


Figure 10. Household Income Distribution and Population Change Trend versus time based on Zip Code 21204 in Baltimore County (Towson).

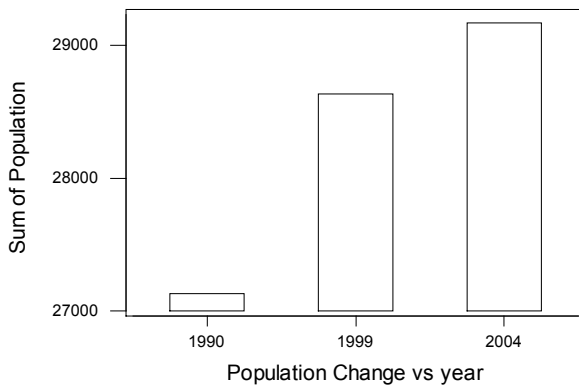
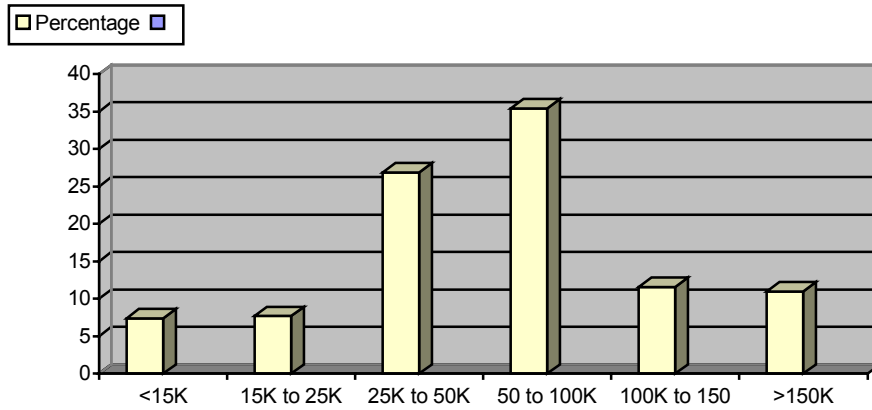


Figure 11. Household Income Distribution and Population Change Trend versus time based on Zip Code 21208 in Baltimore County (Pikesville).

Table 3. Average Population Change based on 15 selected zip codes in Baltimore City

zip code	1990	1999	2004	Percentage of Change From 1990 to 1999	Percentage of Change From 1990 to 2004
21201	16845	15409	14137	-8.524784803	-16.07598694
21202	27876	25285	23607	-9.294733821	-15.31424882
21205	23588	19886	17936	-15.69442089	-23.96133627
21206	52174	46744	43421	-10.40748265	-16.77655537
21207	50171	48807	47823	-2.718702039	-4.679994419
21210	11682	10610	9855	-9.176510871	-15.6394453
21211	19673	16967	15389	-13.75489249	-21.77603822
21216	42520	35748	32239	-15.92662277	-24.17920978
21217	53062	44342	39963	-16.43360597	-24.68621612
21218	57527	50771	46253	-11.74405062	-19.5977541
21222	58617	59700	60193	1.847586878	2.688639814
21223	38454	31825	28649	-17.2387788	-25.49799761
21224	54149	46386	42649	-14.33636817	-21.23769599
21225	34744	32351	31226	-6.887520147	-10.12548929
21229	53933	47694	43875	-11.56805666	-18.64906458
Total	595015	532525	497215	-10.50225625	-16.43656042

Table 3 gives the percentage change of population on the 15 selected zip code areas in Baltimore City and also individual comparison with the percentage change in Park Heights Community. For the data about the Park Heights community, it is evident that the population decreased by more 13% from 1990 to 1999 and by about 21% for the year of 2004 versus 1990. This is a significant decrease and the information is vital to the redevelopment of the brownfield in Park Heights in Baltimore City.

Statistical Analysis for Property Value Assessment

In Brownfield redevelopment assessment, it is important to predict the possible impacts that the future investment projects can bring in. It also becomes necessary to conduct statistical analysis on the existing property value in the area. For statistical reason, we randomly select a sample of 19 household addresses. The sample mean (\bar{X}) and the sample standard deviation are given by

$$\bar{X} = \frac{X_1 + X_2 \cdots + X_n}{n} \quad (1)$$

$$S = \sqrt{\frac{\sum_{i=1}^n X_i^2 - \frac{\left(\sum_{i=1}^n X_i\right)^2}{n}}{n - 1}} \tag{2}$$

Where X_i is the property value of the i th address. The $(1-\alpha)$ 100% confidence interval is given by [14]

$$\bar{X} \pm t_{\frac{\alpha}{2}, n-1} \frac{S}{\sqrt{n}} \tag{3}$$

Where $t_{\alpha/2, n-1}$ is the $\alpha/2$ upper percent point of the t distribution with a degree of freedom $n-1$.

The property value assessment data for this sample of 19 households is given in Table 4. Using the computer statistical analysis software Minitab [15], we can summarize the result in Figure 11.

Table 4. Property Value Assessment Data

Address	Total Property Value	Land Value	Area	Use
4816 Reisterstown	27330	7000	1424	Residential
4809 Reisterstown	15000	3000	1352	Residential
4817 Reidterstown	27330	7000	1424	Residential
4559 Reisterstown	68700	12700	2380	Commercial
4622 Reisterstown	17000	4000		Residential
4640 Reisterstown	26000	5000		Residential
4617 Reisterstown	14100	3000		Residential
4616 Reisterstown	17000	4000		Residential
4833 Reisterstown	15000	3000		Residential
4610 Reisterstown	17000	4000		Residential
4855 Reisterstown	15000	3000		Residential
4615 Reisterstown	14100	3000		Residential
4612 Reisterstown	12000	3000		Residential
4831 Reisterstown	15000	3000		Residential
4823 Reisterstown	15000	3000		Residential
4735 Reisterstown	8100	2000		Residential
4631 Reisterstown	12000	3000		Residential
4603 Reisterstown	14100	3000		Residential
4613 Reisterstown	14100	3000		Residential

As shown in Figure 12, the mean total property value is \$19,151. The 95% confidence interval for the mean total property value is \$12,864 to \$25,437. These statistical results were calculated using a statistical software based on Equations (1) through (3) with the level of significance $\alpha=0.05$. Thus, the point estimated value of the average property value is \$19,151 and the interval estimated value is from \$12,864 to \$25,437. Compared with the assessed property value in other

areas in Baltimore City, it can be concluded that the property value in the Park Heights Brownfield community has been significantly affected and jeopardized by the declining economy and the declining population in the community. It is desirable to the community leaders, residents, governmental agencies to attract more business and investments through the Brownfield redevelopment projects.



Figure 12. Histogram of Property Value

Conclusion

The issue of brownfield redevelopment has attracted more and more attention of the nation in recent times. Two brownfield sites in Park Heights community have been selected for our project of “brownfield assessment on selected sites in Baltimore City” as a demonstration. The environmental assessment results indicate that Site I was a BP Gas Station, according to the interviews with the local residents. The gas station was closed more than 20 years ago and the site has been idle since then. The gas tank may be still under ground but the city does not have data records to confirm this information. It is not clear whether the tank was filled with concrete/earth or empty. Also according to our preliminary analysis, including laboratory analysis of soil samples, no significant evidence of contamination has been found. Site II was a Dodge dealership, a glass company, and a convenience store prior to its utilization as a playground 30 years ago. The land has been idle or as a general park since then. Based on site observation and soil sample analysis, there is no significant evidence of contamination. As a result, it can be concluded that this site may be used for the proposed golf course project. No significant risk of health-hazardous liability is anticipated for the investors and the new site users.

The economic assessment is another part of our assessment project. Our goal was to investigate into the existing data about the neighborhood business economy, such that we can establish the baseline information. The baseline study on the household income, population information and average property value in the community has been conducted. All evidences indicate that both population and economy are declining. The predicted values for a few years later are also declining. It was also observed that a large portion of the business in the area is related to auto repair workshops, which may have unfavorable impacts to the issue of attracting more residents.

This project has demonstrated how an interdisciplinary project can be executed which has an impact on the community in effect meeting the components of the mission of the university.

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