Toward A Sustainable Los Angeles: A "Nature''s Services" Approach

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TOWARD A SUSTAINABLE LOS ANGELES:
A "NATURE'S SERVICES" APPROACH

A Second Year Report to the John Randolph Haynes and Dora Haynes Foundation

February 2003

Stephanie Pincetl
Jennifer Wolch
John Wilson
Travis Longcore

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EXECUTIVE SUMMARY

Global warming, loss of biodiversity and concern about urban sprawl have led to increased advocacy for "smart growth," "managed growth," "new urbanism," and other similar approaches focused on the urban fringe. Rarely are older urban neighborhoods considered appropriate targets for efforts to integrate nature into the urban fabric, but open spaces such as urban parks and forests, street trees and permeable surfaces, provide what ecologists term "nature's services" – the work natural systems can do to mitigate urban pollution and run off, and offer cost-effective, environmentally sustainable substitutes for conventional urban infrastructure. With the undeniable impacts cities have on the environment, both locally and at a distance, solutions that assist cities themselves to begin to remedy their own effects, seem increasingly important to develop.

Research Program

To investigate new approaches for making existing urban areas more sustainable, the USC Sustainable Cities Program received funding from the John Randolph Haynes and Dora Haynes Foundation. This is the second year report of our research project "Toward a Sustainable Los Angeles: A Nature's Services Approach, " a study aimed at developing more sustainable land use practices in the older inner core of Los Angeles by showing the potential of "best practices" using an innovative geographical information systems program, CITYgreen. CITYgreen models the benefits that natural systems provide to mitigate urban pollution, enhance the quality of life, and offer cost-effective, environmentally sustainable substitutes for conventional infrastructures.

The research had three main objectives:
- Testing the applicability of existing GIS analytic tools, and specifically CITYgreen, to assess nature's services in southern California;
- Investigating the feasibility and success of public participation and empowerment through the use of a GIS-based approach in the Vermont/Western area, an ethnically and linguistically diverse neighborhood;
- Developing policy recommendations to increase the ecological sustainability of the city and region.
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We chose to study a 2.2 square mile area in the Vermont/Western portion of Council District 13. This geographic location was the subject of a City of Los Angeles Specific Neighborhood Area Plan (SNAP) aimed at creating a transit-oriented neighborhood, and is particularly park-poor. In addition to a detailed GIS CITYgreen analysis of the study area to assess nature's services, we investigated the values and attitudes of local residents – largely Latino immigrants – toward nature in the city, and to potential changes in the urban fabric that might enhance nature's services, that is, to the deployment of best management practices in their neighborhood. In addition, we thought it was important to understand the attitudes and values of youth regarding nature in the city. Much is said about the importance of parks, recreation, and nature in the city for children and youth, yet little research has been

conducted on youth themselves with respect to their attitudes and values, and so we augmented the project with an analysis of youth attitudes.

Besides our main research tasks, we addressed two additional critical issues. One was the background context for our analysis of nature in the city: where are currently existing parks and open spaces? We found that little research had been done on this topic, and so we investigated the current distribution of parks and open space in Los Angeles, and their accessibility to residents, as measured by 1/4 mile radius indicating walking distance. This additional research documented existing open space resources in the city by race, class, ethnicity, and numbers of children. We also analyzed the distribution of Proposition K funds, a park bond passed by Los Angeles voters in 1996. The portion of the project provides an analytic tool for potential future implementation of a nature's services approach by identifying the most park poor parts of the City.

Another issue was how provision of additional nature's services might influence the economic development of urban neighborhoods. Our research team therefore investigated the relationship between housing prices and green space in the Vermont/Western study area to determine if there was a correlation between vegetated spaces (green cover) and housing prices. This analysis too can inform future implementation of a nature's service approach to urban morphology by targeting areas where housing prices and economic development opportunities could be enhanced by greater efforts to green the urban fabric.

Lastly, as part of the project, we arranged for the Urban Land Institute to conduct a daylong panel, held at USC, to bring development and policy experts into a discussion regarding enhancing sustainability through the augmentation of nature's services in the Vermont/Western Area. Participants were taken on a field trip through the study area and returned to discuss possibilities and obstacles. The full report from that daylong technical assistance panel discussion is forthcoming and its summary recommendations are included in this report.

Results

Findings from the application of CITYgreen and other GIS analytic tools validated our hypotheses both about the current lack of existing vegetation, parks, and open spaces, and about the positive environmental benefits the study neighborhood would derive through the enhancement of nature's services. We found that increasing tree canopy, for example, would measurably decrease the area's heat island, absorb air pollution, and decrease storm water runoff. This last benefit would be quite significant in real dollar terms. We also determined that improving the level of nature's services in this small 2.2 square mile area could be implemented effectively within existing "open" spaces such as planting strips, parking lots, schools, vacant and abandoned lots – space often considered residual or wasted. The results, therefore, point toward substantial positive benefits the city would receive, were greening projects to be undertaken.

Additionally we found that the residents of our study area, largely Latino but with a significant proportion of Armenians, were both informed about the services nature renders in the urban environment and extremely enthusiastic about enhancing nature's services. Focus groups revealed residents understood quite well that trees absorb air pollution ("clean the air") and cool the atmosphere. They also noted trees and vegetation absorb noise. Further, they were quite receptive to alternative scenarios for greening the interstitial spaces of their

area, all the while soberly noting possible obstacles and difficulties. They expressed the sentiment that because of their low incomes and their status as recently arrived immigrants, it was unlikely they would be able to receive the same services as in more affluent neighborhoods. They were both unfamiliar with city government and felt politically disempowered. Thus, despite a strong interest in increasing nature's services in their neighborhoods, inspired by the greening scenarios researchers presented, most residents were fatalistically pessimistic about the possibilities of such changes taking place in their neighborhood. They pointed to more affluent neighborhoods having more vegetation and trees as proof of their disadvantaged position. Our research conducted on the relationship of urban green space on housing prices confirmed the sentiments of residents: places with more trees and closer to greened spaces did command higher real estate prices; but those were scant in this study area. Naturally, questions of gentrification and affordability become an issue when neighborhoods become more desirable places, such as when they are greener, though this research did not address those potential consequences.

Because much of the call for parks invokes the need for them by youth, our researchers conducted an additional focus group with high school students. They expressed that multiple use spaces for socializing, playing or relaxing, and enjoying green space were lacking and that these are the types of open space that they would prefer. They demonstrated a keen interest in local parks, had an awareness of a variety of maintenance issues in different park contexts, and were concerned about park safety. Their concerns and awareness were similar to those of the adults, and their ideas about desirable open spaces were similar to much of what is being called for in new urbanist literature (Lennard and Lennard 2000): a mix of uses that include recreation such as shopping or cafes, with active recreation such as skateboarding, as well as spaces to congregate, perhaps under a tree, on benches in a pleasantly landscaped environment.

The Urban Land Institute panel concluded that there were many obstacles to greening small spaces due to the numbers of public agencies that would have to provide permits. Indeed, a portion of the workshop was spent enumerating all of the city departments that would be involved in creating a small park; the list was extensive. In addition, departments that would be expected to pay for park infrastructure would not necessarily capture direct benefits (such as better air quality from tree planting) that would accrue to other public agencies, some beyond the city itself. Yet it was widely believed that with the proper leadership from the Mayor, many of these obstacles would be overcome through streamlining, setting priorities, and interdepartmental cooperation mandated from the top.

Our thorough study of park location in the city and the distribution of Proposition K funds demonstrated that park distribution was unequal in the city, and that low-income communities of color residing in the older inner core had less access to park space than white-dominated and higher income areas. Further, Proposition K funds, while successfully targeted to areas with high proportions of children, had not achieved much efficacy at reducing the unequal distribution of parks, particularly at providing parks within a 1/4 mile walking radius. The Vermont/Western study area is certainly one such area.

During the process of the research, we were invited to become involved in other related activities. The Urban Land Institute held its annual Mayor's Forum on *Bringing Community Back to the City: Streetscapes, Parks, and Open Space.* Our work on parks and equity was highlighted at that event, creating greater awareness among city officials and departments of the unequal distribution of parks and open spaces and the impacts of Proposition K on that distribution. We participated in formulating the "Walk in the Park" report developed by a

coalition of grass-roots activists (The Verde Coalition) and Los Angeles City officials that resulted in the passage of a motion by the Los Angeles City Council creating an urban land trust (see Appendix 1). We also developed strong working relationships with both the Trust for Public Lands (TPL), entering into a Memorandum of Understanding to work on the GIS-based research in support of TPL's work on urban park-making; and with TreePeople, also through a Memorandum of Understanding, to work collaboratively on adding a water quality component to their GIS T.R.E.E.S. model and to developing a GIS model that might combine the best attributes of CITYgreen and the TREES model. Through these collaborations, our support from the Haynes Foundation will have long-lasting multiplier effects on policy-oriented research on nature's services and city parks.

Policy Recommendations

The research is yielding important policy avenues for making the City of Los Angeles more sustainable. It has demonstrated that there are significant economic, social, ecological and environmental reasons for establishing new programs that will transform small interstitial spaces into greened open spaces, most particularly in parts of the city that are significantly park poor. City programs should include developing criteria, policies, and programs to:

- Replace impermeable surfaces with permeable ones, including alleyways, playgrounds, parking lots and other such surfaces;
- Create and maintain urban runoff bioswales to enhance ground water recharge, reduce Total Maximum Daily Loads or TMDLs (of runoff pollutants) and reintroduce fauna and flora in the city;
- Enhance and maintain the urban forest using climate-appropriate trees that will mitigate the urban heat island effect and contribute to property values;
- Use vacant "wasted" spaces such as sidelots, parking medians, spaces between buildings and roads, to enhance nature's services by an aggressive greening campaign;
- Make open spaces that are integrated into the urban fabric that build on and into mixed uses such as cafes, bookstores, skate parks, and housing such that the open spaces provide connections and recreation spaces for youth, residents, workers, and visitors;
- Develop cost-sharing mechanisms among existing city departments and regional agencies to finance the reintroduction of nature's services in Los Angeles and its long term maintenance;
- Create and implement new budget accounting measures that integrate nature's services in budget lines;
- Streamline the process to convert vacant and abandoned parcels, rights-of-way, and other potential small open spaces to park lands in the City;
- Create funding mechanisms for locally based neighborhood groups willing to assist, participate, and undertake such greening efforts;
- Provide training and technical assistance for departments, agencies, and community groups in enhancing nature's services;
- Target areas of the city that are most deprived of access to parks and open spaces to increase the equitable distribution of these amenities.
- Develop accounting methods that capture the value of nature's services for relevant agencies and departments.

Overall, this is a time of change for the City of Los Angeles. There is an increasing recognition of the role that nature's services can play to make the city more sustainable, and

indeed a commitment on the part of the Mayor to making Los Angeles more sustainable. The research conducted for the Haynes Foundation has played an important role in this change, pointing out measurable economic, ecological, environmental, and social benefits to be derived from enhancing nature's services in the city. Our findings showed there is a great interest among residents for such an urban transformation, and that given the great inequities in the distribution of parks and open spaces in the city, this approach could help in remedying the unequal access to such amenities in the most dense and disenfranchised neighborhoods. Such research should help in directing attention to the role that cities themselves can play in reducing their environmental impacts through intelligent land use practices. It is not enough to be concerned with the effects of urban growth and sprawl; indeed it is also imperative to rethink the city itself.

INTRODUCTION

With over 50 percent of the world's population now living in cities, researchers have finally turned to the effects of urbanization on global environmental degradation and begun to ask whether cities themselves can reintegrate natural systems in the existing urban fabric and begin to mitigate their own impacts internally (Beatley 2000). The call for sustainable land use practices – to date – has largely been directed at the urban fringe rather than toward the central city. In contrast, our intent through this research project is to contribute to reassessing the *existing* urban fabric in Los Angeles and similar cities for its potential to contribute to global sustainability. Parks and open spaces, and the reintegration of natural ecosystems, provide economic, environmental and social benefits fulfilling the balanced approach called for by sustainability. Parks, open spaces and green spaces not only provide environmental benefits, but they are essential contributors to quality of life, economic vitality, and human well being in cities as well, as William Whyte and others have shown. Neighborhood-scale open spaces and community greening increase real estate value and assist revitalization efforts in depressed inner city residential real estate markets (Garvin and Berens 1998, Conway 2002). Additionally, new research has conclusively shown that property and violent crimes decrease with higher levels of greening (Kuo and Sullivan 2001). The evidence of the positive effects of greening has been corroborated abroad as well. English researchers studying a working class immigrant London suburb offer evidence that greater integration of open spaces, parks and other types of nature in the city is greatly desired by urban inhabitants, and where it exists it is a significant element in people's lives. It is woven into people's regular life-patterns, and provides an element of beauty and relaxation, an important contributor to the quality of life, even if it consists of merely being able to walk down a shady, tree-lined street (Burgess et al. 1988, Williams 1995).

Reintegrating nature's services in the densely developed parts of the city may seem like a daunting task, yet a closer look yields many opportunities: vacant and abandoned parcels, alleyways, driveways, sidewalk planting strip widening and street narrowing, the transformation of parking lots and mini-malls to include trees, bioswales and permeable surfaces, rooftop gardens, greened roundabouts – opportunities abound. It requires looking at the urban fabric through different eyes, seeing what are now hard open surfaces or simply empty spaces, as potential spots for reestablishing flora and fauna. Such a shift in thinking about the urban fabric is occurring gradually as the City of Los Angeles, the region, and beyond grapple with problems of water quality; the need for greater ground water recharge; the urban heat island and air pollution; and the cost of conventional infrastructure. Cities are finding that reintroducing nature's services in the city can offer cost-effective improvements: trees contribute to cooling the urban heat island effect, they help reduce stormwater and urban runoff and absorb air pollution; well designed permeable surfaces can mitigate stormwater and other runoff – more permeability allows urban run-off to percolate back into the soil and replenish ground water resources; and what is more, these natural systems create more livable and healthier communities.

Cities and developers across the country are beginning to test the use of nature's services. Chicago, for example, has planted a garden on the roof of city hall, lowering the temperature of the roof by as much as 50 to 80 degrees on a hot summer day, showing how the urban heat island effect can begin to be mitigated. Mayor Richard Daley Jr. is developing a coordinated effort that also includes building "green" homes with reflective surfaces, landscape ordinances to enhance greenery in "median planters" along roads and in parking lots; and turning asphalt alleys into porous gravel so that rainwater can seep through. Davis California, found that boosting shade in parking lots cut temperatures, increased comfort in cars and

improved air quality by cutting emissions in car start ups (Lyman 2002) and reduced gasoline evaporation. Further, since conventional infrastructure is often expensive, using a nature's services approach can also provide more cost effective solutions while also being more environmentally sensitive. Using detention basins planted with riparian vegetation, for example, offers a means to address storm water with less infrastructure investment. Village Homes, a subdevelopment in Davis, California, has successfully implemented this approach, avoiding the need to build storm drains altogether.

Another function renaturalization of existing urban areas can serve is to encourage greater local biodiversity – making cities important places for ecological systems to survive and grow. Indeed, ecologists are finding that there can be high levels of biodiversity in cities, and that cities are interesting, legitimate environments. Protecting those places of biodiversity may be crucial to our environmental future (Stille 2002: A21). Fauna and flora survive inside vacant lots, and abandoned industrial sites. As Christine Alfsen-Norodom, coordinator of Columbia University and UNESCO's joint program on the biosphere and society remarks "there is no area left in the world that has not undergone serious human impact and this makes the whole planet a man-made planet, and cities are only the extreme example of that. . . The choice is no longer between cities and wildness, it is, in the face of increasing population, between density and sprawl" (Stille 2002: A23). Thus cities serve an important ecological function already, and offer the potential for being even more significant centers of biodiversity through intelligent creation and management of open spaces. Smaller interstitial open spaces will not support large fauna, certainly, but they can be made to be hospitable to indigenous plants, insects, birds, and small animals, as well as to naturalized exotic species.

Other research has pointed to the links between urban sprawl and obesity, which is becoming a serious public health problem and cost to society. Most evidence to date is circumstantial, but such factors as tree cover, aesthetics, pedestrian safety of sidewalks and the use of linear parks (tree lined promenades along boulevards, for example), might assist in combating obesity as parks and greenways are more inviting to pedestrian activity (Kreyling 2001). Neighborhoods that provide spaces for children to play outside, safe and pleasant walking routes to school, and pedestrian accessible services are increasingly seen as part of addressing automobile dependence which is linked to obesity. And these do not have to be large spaces. Small corner basketball courts, mini playing fields, swing sets, places to garden, or to walk to meet friends all constitute opportunities for physical activity and socialization.

Additionally, planners are recognizing that small urban spaces are important to overcome the social isolation built into our modern communities (Knack 2000). Places like Santa Fe, Santa Barbara, and Santa Cruz are creating plazas. Plazas that are accessible on foot by a core community with a mix of uses in buildings, pleasantly landscaped open spaces, and that are welcoming to young people, families with children and for diverse socioeconomic groups (Lennard and Lennard 2000) greatly enhance neighborhoods. Again, they do not have to be very large, and can serve an open space need in already developed neighborhoods through creative redesign of existing buildings. Such open spaces also provide destinations for youth that tend to be lacking in many cities and suburbs.

Other approaches to providing open space in the city and enhancing nature's services are well known. Community gardens, for example, have long provided anchors for communities, as well as safe green spaces where there are no parks (Raver 2002). Pocket parks too have been part of the urban fabric in older, denser cities for a long time. New York, Paris, London – indeed most European cities – have made use of small interstitial spaces to create places for

people to enjoy a bit of nature and sociability. They provide important means of connecting people to neighborhoods and to each other. Urban researchers are also drawing attention to the importance of everyday nature as compared to "destination" nature such as a park. For example, trees along a street may provide an opportunity to watch birds while washing dishes in front of the kitchen window. Such quotidian experiences of nature in the city provide aesthetic enjoyment and pleasure (Williams 1995). Creating spaces in the city for those kinds of workaday human/nature interactions is also an important part of creating more livable cities, cities where nature provides multiple services.

Today we realize that nature in the city provides multiple benefits. Even in cities such as Los Angeles, built on a kind of "suburban assumption," most people live in urban areas that are aging rapidly and densifying (Dear 2001). Environmental, economic and social well being are indeed interconnected, as The World Commission on Environment and Development (Brundtland Commission) put forth as the tenets of sustainable development in *Our Common Future* (1987). Los Angeles offers tremendous potential to (re)develop in this direction.

Los Angeles is well known as the nation's capital for air pollution, traffic congestion, and sprawl. The second largest city in the United States, it is perhaps less well known as the second densest in the country, at over 8 persons an acre (Fulton et al. 2001). Additionally, its lack of parks compared to other large cities is legendary, and historic (Harnik 2000, Hise and Deverell 2000). Today this means that for entire neighborhoods, there are no accessible parks within walking distance, and large parks such as the approximately 4,000 acre Griffith Park (created in the late nineteenth century), must turn people away on weekends. Further, poorer, denser neighborhoods where there are concentrations of people of color and immigrants are at an even greater disadvantage than their whiter, more affluent counterparts. According to the Verde Coalition, a grassroots organization working to provide more parks in low-income neighborhoods, the 5 poorest City Council districts have just 17 percent of the total neighborhood park space (Verde Coalition 2002). In this context, it is also important to recall that the results of surveys after the 1964 Watts Riots and the 1992 civil unrest showed that lack of parks was a concern that was even stronger than poor relations with the police. Yet, to build parks to satisfy acreage per capita goals that the City has set out for itself would require drastic condemnation and destruction of housing, clearly an unacceptable tradeoff. Thus, to create parks and open spaces to meet the needs of the most disadvantaged urban residents, creative new approaches seem essential.

There has been widespread recognition of the severity of the lack of parks in Los Angeles and the County of Los Angeles, leading park advocates to put park bond propositions on the ballot that have been passed in the past decade. Proposition A was a county bond initiative passed in 1992, with a similar measure passing in 1996; Proposition K, a City park bond initiative, passed in 1996; and statewide Propositions 12 and 13 passed in 2000. Together, these bonds have provided billions of new park dollars to the Los Angeles area. Proposition K has assisted the Los Angeles City Department of Recreation and Parks to begin to catch up on long deferred maintenance of existing facilities, and funded the new Science Center. Bond monies have allowed some nonprofit organizations to apply for funds for new projects on a competitive basis; they have funded the refurbishment of specific facilities, tree planting, graffiti removal and the creation of jobs for "at risk" children, trail building, and natural land acquisition. These new monies signify a commitment on the part of voters to creating and maintaining parks and open spaces. They demonstrate that the public recognizes the park scarcity in the City and County and is willing to spend money to remedy the situation. But little of this money has been allocated to creating the kinds of small open spaces that have been proven so effective in revitalizing neighborhoods and renaturalizing cities.

This is partly because the traditional model of park provision is not only insufficient – there is not enough available land to build big enough parks to conform to the City's standards – but inadequate to meet the needs of people where they live. Traditional parks and recreation facilities are derived from a suburban model in which people drive to those amenities. Further, they are not designed to enhance both the human and the environmental benefits of open space. As our research shows, in dense, older neighborhoods, this can be achieved, but only if the approach is "open space is where you find it," an opportunistic strategy. By recognizing existing opportunities to provide small parks and vegetation – vacant and abandoned parcels, interstitial spaces, street planting strips, parking lots, alleyways and other areas – the ability of nature to provide services to residents can be revitalized and Los Angeles neighborhoods can become more livable, and people will have access to open spaces in the course of daily life. In sum, Los Angeles can begin to move toward greater sustainability through reworking its existing land uses.

THE RESEARCH

While there is much written about the benefits of small open spaces, neighborhood parks and enhancing nature's services in the city, quantitative and qualitative research on the benefits of nature's services in a city like Los Angeles needs greater attention. TreePeople, a Los Angeles based tree planting and urban greening organization has been working on these issues in the region for nearly two decades, however, the question of how to combine small urban spaces in the city's most park poor neighborhoods, with the benefits that nature can provide, remains a major challenge. Attitudes and values of residents toward nature in the city have received little attention, particularly in the dense inner core where low-income immigrants live, and that tend to have the least amount of greenery. Research on attitudes and values of diverse urban residents about nature in the city is scarce overall, and has tended to focus on how different races, ethnicities and income groups use and value existing parks and recreation opportunities and to learn about inter-group differences. Our team therefore set out to investigate the effects of increasing nature's services in the city of Los Angeles, and how people would react to such an effort.

Research Aims

The research aimed to assess the feasibility of more sustainable land use practices in the older inner core of Los Angeles by showing the potential of "best practices" using an innovative geographical information systems (GIS) program, CITYgreen. The project also was designed to investigate and understand the attitudes and values regarding nature in the city of low income, largely immigrant residents who live in a dense part of Los Angeles. This knowledge was necessary to gain to inform the future direction of policy for enhancing nature's services in such neighborhoods. As described below, researchers used GIS technology in both aspects of the research, and tested its viability.

The CITYgreen program models the benefits that natural systems provide to mitigate urban pollution, enhance the quality of life and offer cost-effective, environmentally sustainable substitutes for conventional urban infrastructures. Only recently has the technology become available to express in economic terms the benefits that accrue from nature's services, particularly the urban forest. Specialized geographic information systems applications have been developed to quantify and visualize benefits from urban forests (Miller 1995). GIS

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technology allows urban features – trees, buildings, shrubs, grass, and impermeable surfaces – to be presented in graphic form from which nature's services benefits can be calculated and translated into economic terms. Such urban ecosystem analysis, developing explicit economic benefits, has proven influential in motivating some cities to make more sustainable choices in their urban planning (American Forests 1999, McPherson et al. 1999).

As a complex technology requiring high initial capital investment and substantial technical proficiency, many researchers have considered the use of GIS in planning as "top down, technicist, and aligned with a rational positivist orientation" (Talen 1999, see Aitken and Michel 1995). As such, it is perceived as having little room for bottom up community involvement, or incorporation of community experience and vision into its implementation. In response to this preconception, a concerted effort has been made by GIS researchers to explore and expand public participation and community empowerment in the use of GIS technology for planning, in so doing creating the field of 'public participation GIS' or PPGIS (NCGIA 1998).

To date, public participation in GIS has been limited by boundaries of geography and subject matter. In general, projects in the developing world concentrate on establishing property rights or on sustainable natural resource management (e.g. Jordan 1998, Lewis 1995). For rural areas of the first world, such planning projects also address natural resources (Kim 1998, Holden 1999/2000). For example, the Wildlands Project works with local communities of scientists and conservationists and uses GIS to envision a continent-wide network of connected open spaces (Noss 1994). In cities, much of the concentration of effort, and the use of GIS, have been on empowering citizens to become aware of and react to environmental hazards (Rich et al. 1995). Relatively less attention has been given to natural resources within urban areas, especially from a nature's services perspective, and even less to bottom-up local empowerment and public participation in urban natural resource and open space planning. This project implemented a public participation GIS or PPGIS process for environmental planning in a highly urbanized area of the City of Los Angeles.

Thus, we began with three purposes:

- Testing the applicability of existing GIS analytic tools to assess nature's services in a dense urban neighborhood in southern California
- Investigating the feasibility and success of public participation and empowerment through a GIS-based visualization approach to introducing nature's services in an ethnically and linguistically diverse neighborhood, and
- Developing policy recommendations to increase the ecological sustainability of the city and region.

As the research progressed several new issues came to the fore.
- Were youth attitudes toward open spaces, parks and nature in the city different than those of adults? Given that arguments for park bond initiatives often invoked the needs of children and youth, this seemed important to investigate. Again, available research was not very informative in this regard, and the focus group we conducted with High School youth of the area added another critical dimension to our policy recommendations.
- Additionally, literature on parks and open spaces claims that such greenery enhances property values. Could we find such a correlation in our study area, or near it, where some streets had dense mature street trees and nearby greenery? The study

conducted on property values in this area confirmed previous work, even in a neighborhood where property values were lower overall than in other parts of the city.

- What is the current distribution of parks, open spaces, and recreation facilities within a 1/4 mile walking radius? Are parts of the city more park rich that others, and how does that correspond with race, ethnicity, income and numbers of children? Researchers developed a GIS based analysis on parks and equity of park access in Los Angeles, which pointed out where the most park poor neighborhoods were located. This knowledge is essential for efforts to target parts of the city for enhancing nature's services, bringing about greater urban greening and access to open spaces.

In summary, we chose to use a nature's services approach to Los Angeles because we wanted to explore the potential of renaturalizing the City in one of its most hardscaped areas. This corresponded to a low-income neighborhood dominated largely by immigrants and people of color. If nature's services could be measurably enhanced in this part of the city, and residents were receptive, then it became feasible to develop policy recommendations for the City.

Study Site

The Vermont Corridor Station Neighborhood Plan area was chosen for our study site. It is approximately 2.2 square miles within the city of Los Angeles, five miles NW of downtown Los Angeles. It is home to approximately 50,000 residents and is expected that by 2020 there will be 62,000 residents. It is one of the denser neighborhoods in the city, roughly three times denser than the city average, at about 36 residents per acre. More than 90 percent of the housing stock is multifamily occupied by renters. Approximately 25 percent of adults have not finished high school and about 60 percent of the population is foreign born. There are enclaves of Thais, Koreans, Filipinos, Armenians, Russians, and Central Americans. The area has no neighborhood parks, community pools or recreation centers and the 48-acre Los Angeles City College campus serves as the largest open space in the area. The Department of Recreation and Parks occasionally contracts with the Los Angeles Unified School District for use of recreational facilities, particularly for youth sports activities during afternoon hours and on weekends (City of Los Angeles Planning Department 2000).

Figure 1. Station Neighborhood Area Plan (SNAP) study area in central Los Angeles. Each subsite used in CITYgreen analysis is indicated by land use.

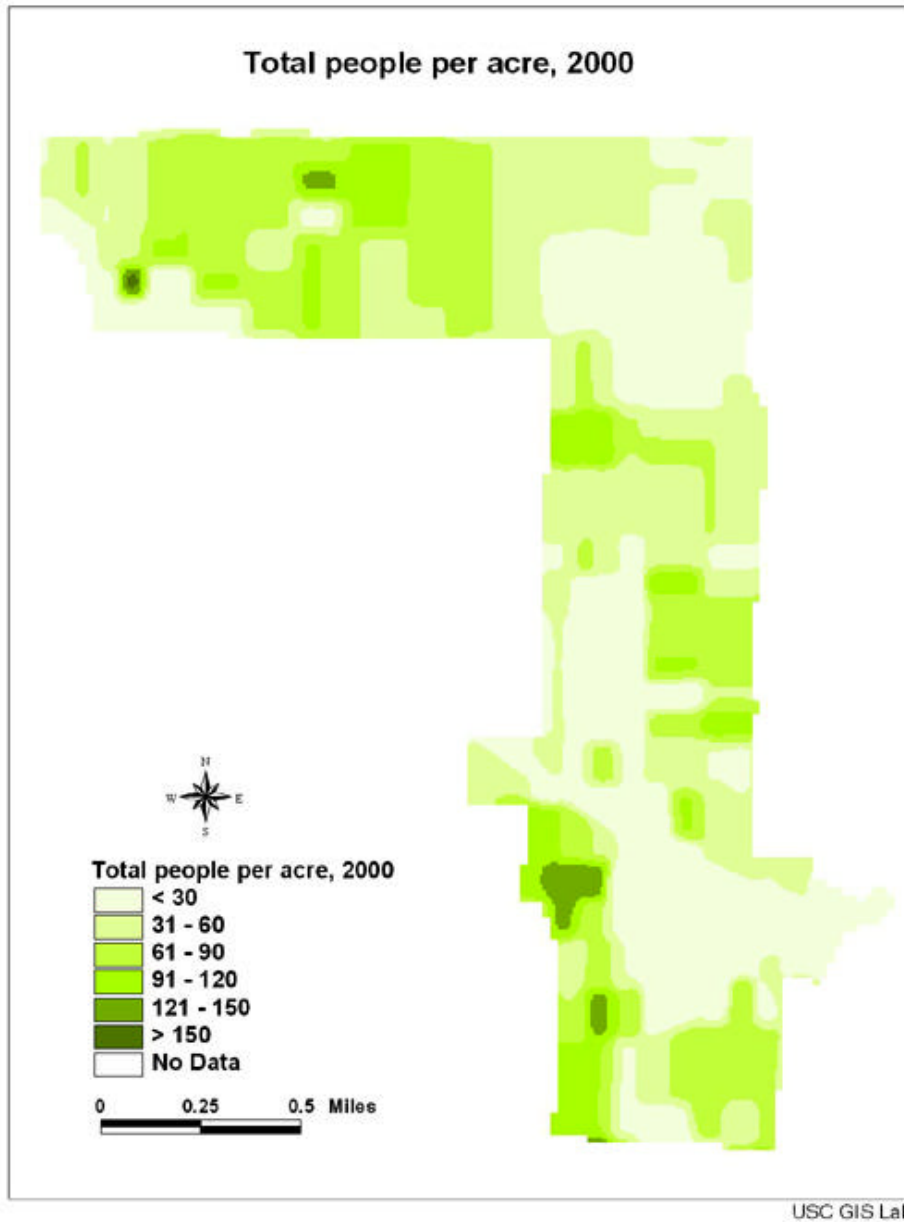TOWARD A SUSTAINABLE LOS ANGELES: A "NATURE'S SERVICES" APPROACH

Figure 2. Population density in SNAP study area.

In this area there are several important human service providers, including the Breeze Foundation and the Children's Bureau, that have been actively supporting the creation of community gardens and small parks. Additionally, EcoVillage, a collaborative committed to transforming the urban fabric to more sustainable land use practices, is located in the study area. EcoVillage provides information and model programs for local residents. When she was in office, Councilwoman Jackie Goldberg made parks a priority of her tenure and attempted to create a link between new market based housing and park funding, though overall this proved controversial and no parks were created.

Nature's Services: CITYgreen Analysis

CITYgreen is a Geographic Information Systems program that models the benefits that natural systems provide to mitigate urban pollution: air pollution, the urban heat island effect, stormwater runoff. Developed by American Forests, CITYgreen was intended to be used as a tool to demonstrate that ecosystem function loses that occur as a result of increased urbanization at the urban fringe, had real economic costs to the environment that could be quantified (Miller 1995). For example, the loss of forests would add a substantial cost in the form of stormwater infrastructure. Forest loss would also contribute to higher amounts of air pollution, and to increased energy costs.

The study area was divided into three subareas allowing for a geographically stratified sampling scheme. Within each subarea, study sites were chosen to represent three land-use types: residential, institutional (e.g., public schools), and boulevard/commercial. The nine study sites ranged from approximately 7 acres to over 18 acres and followed obvious boundaries to encompass single land uses. Using an orthorectified aerial photograph, features on each of the nine sites – including the trees and the buildings – were digitized into CITYgreen (see Figure 3).

Subsequently, sites were visited with preliminary maps so that mapped features could be updated to correct tree and building shapes and to include grass areas and shrub cover. In addition, for each of the residential sites, the location of windows and air conditioners were recorded for use in the energy usage analysis. Data were collected about each tree, including species, diameter breast height, canopy size, height, health, groundcover, and potential conflicts. Following completion of site surveys, summary data were calculated for each site. At this point, because of the large size of the Los Angeles Community College site, it was split in two, and the southern half chosen for further analysis.

During late 2000 and early 2001, we conducted field surveys at the nine subsites within the study area. All features were mapped and data were collected about each tree. The area surveyed was 146 acres, which included 1,890 trees. Land use was highly correlated with cover variables (Table 1). Institutional and residential sites had significantly more tree and grass cover than boulevard commercial areas. Percent coverage of buildings was not significantly different among all land use types, ranging from 25.5% to 33.3%, and average percent paved area ranged from 45.0% in residential areas to 65.9% in boulevard commercial areas. The last line in the table is for comparative purposes, using the City of Sacramento – known for its shady downtown and urban neighborhoods – for comparison.

Using the land cover percentages, and information about tree location and characteristics, CITYgreen calculates several environmental benefits. It calculates the removal of five pollutants from the air by trees. The model is based on empirical studies of air pollution removal, which result in a description of the relationship between air pollution levels and the rate at which trees remove pollutants. It also calculates carbon storage and sequestration, both of which have attracted increasing interest in the effort to combat global warming. Each site is classified as having one of three tree age class profiles: old, young, or a mixture. Once classified, the model multiplies canopy coverage by conversion factors to give carbon storage and carbon sequestration values. CITYgreen also contains a module to calculate the

energy savings realized when trees shade structures, especially windows and air conditioners. The program also provides a stormwater calculation module that provides information about the quantity and temporal distribution of stormwater flowing off study sides under scenarios with and without trees. The wildlife benefit module of the program is rudimentary. The program contains formulae for the translation of environmental benefits to economic terms. CITYgreen can calculate monetary benefits for pollution removal, energy usage and stormwater reduction.

Site	Area (acres)	Trees	Grass	Shrubs	Buildings	Paved
Commercial						
Vermont	14.4	0.4%	1.2%	0.0%	27.7%	71.0%
Sunset	13.5	2.7%	3.7%	1.1%	30.0%	64.2%
Hollywood	12.8	2.4%	3.2%	0.6%	32.4%	62.5%
Institutional						
Virgil	12.1	6.8%	12.4%	0.4%	19.4%	63.3%
LACC (North)	16.3	14.5%	17.8%	2.5%	37.4%	38.4%
LACC/Braille	18.3	5.0%	9.1%	0.4%	23.3%	64.0%
Grant	6.5	12.9%	10.0%	1.0%	21.9%	59.3%
Residential						
Catalina	21.4	4.5%	17.4%	3.2%	35.3%	45.0%
Santa Monica	12.0	8.2%	15.9%	4.0%	33.6%	45.1%
Kenmore	18.6	9.0%	12.0%	3.0%	31.0%	45.0%
Sacramento Residential		18.4%	21.1%	N/a	20.3%	27%

Table 1. Area and cover in sample subsites in SNAP study area. Totals exceed 100% because both coverage of tree canopy and coverage below canopy are included. Cover measurements from a comparable neighborhood in Sacramento are provided for comparison.

To investigate the potential for increased provision of ecosystem services within the existing urban fabric, we developed two "greening" scenarios (Figure 3). The first scenario is more conservative, and involves improvements to public property, primarily the provision of a full complement of street trees. The second scenario is more aggressive and involves introduction of trees to parking lots and other private property, use of permeable surfaces for parking lots, "Hollywood" style driveways, boulevard medians, conversion of vacant lots to parks, transformation of alleys, and residential "shared streets." The scenarios incorporated suggestions of local residents as they reacted to drafts presented to a focus group.
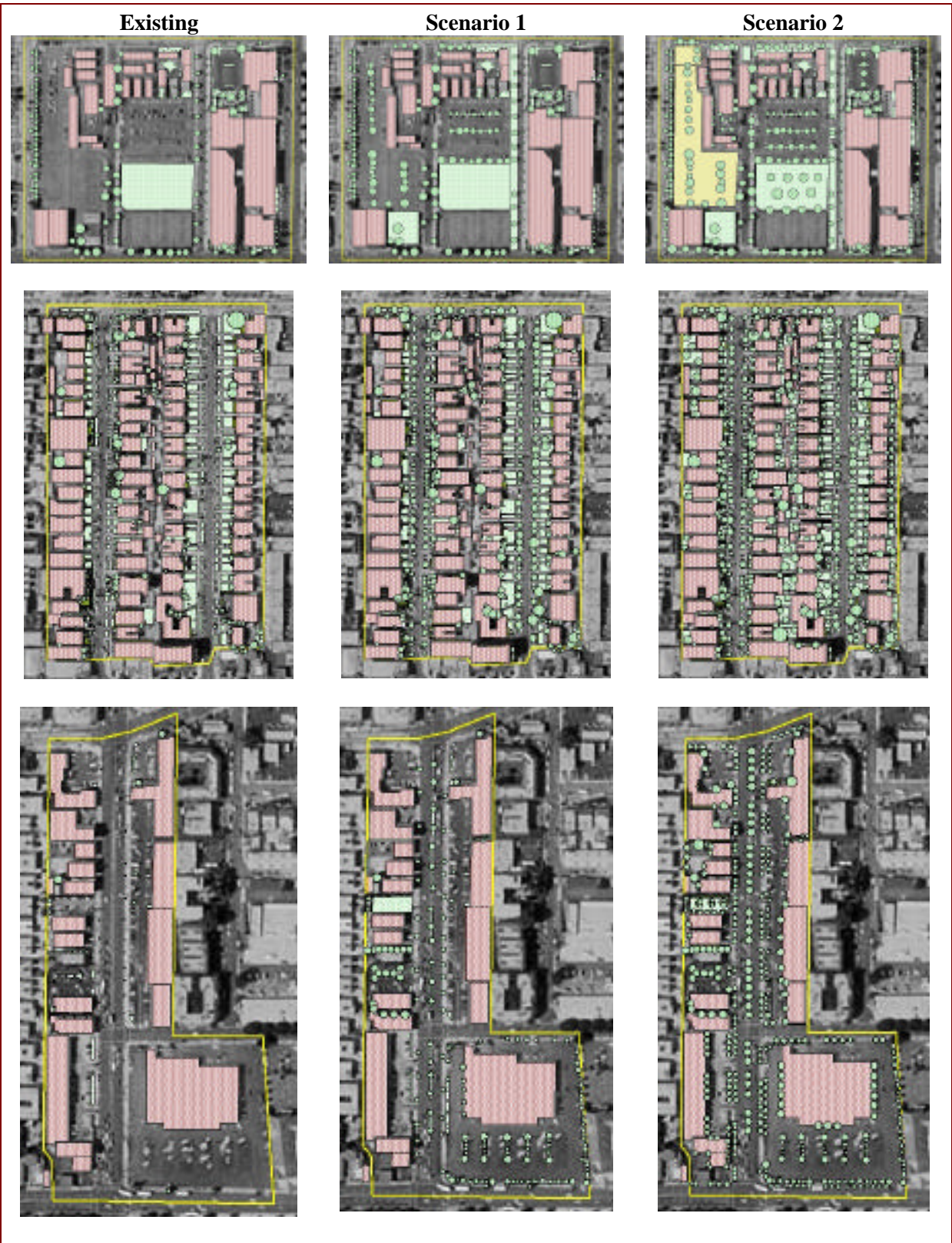
Figure 3. Example greening scenarios by row for 1) institutional, 2) residential, and 3) boulevard commercial sites. Structures are depicted in red, trees and grass in green, and site boundaries in yellow.

CITYgreen was developed to demonstrate the value of nature in northern temperate climate areas of the US undergoing urbanization. Using the model in the dense urban fabric of a southwest city posed methodological problems. Very briefly the problems are the following: trees in Los Angeles maintain leaves year round, thus removing more pollution than the model would account for; the model for energy savings is designed for use with single-family, one and two-story structures and the study site contains mostly multifamily apartments, large institutional structures or large commercial buildings; CITYgreen contains an inconsistency as inventoried features (grass, trees, buildings) may overlap, but the program does not take that into account; and finally monetary savings from stormwater reductions in CITYgreen are predicated on constructing stormwater management infrastructure from scratch. Since most of Los Angeles already has stormwater infrastructure in place, CITYgreen is not a useful tool for this sort of ecosystem service, unless it can be modified to assess incremental benefits provided by greening in meeting the new TMDL requirements imposed by the Regional Water Quality Control Board in 2002, and in helping to recharge the groundwater basins. Our approach was to utilize the value of avoided stormwater storage, rather than costs of new storm drain construction, set at $275 per cubic foot following the TreePeople's T.R.E.E.S. model for Los Angeles (Jones & Stokes Associates 1998). This is closely congruent with an estimate of $300 per cubic foot calculated for Minnesota (Peterson 1990).

Economic values were calculated per acre for each land use type and the greening scenarios devised for them (Table 2). The most remarkable feature of the analysis is that air pollution removal and carbon sequestration – under current market conditions – are far less valuable benefits of greening than is reduced stormwater. If one accepts the economic valuation of $275 per cubic foot of stormwater infiltration (or avoided stormwater storage costs), then urban greening projects should look first to stormwater management agencies as a source of funding. This value should also increase over time as more limits on stormwater *quality* are imposed, such as Total Maximum Daily Load restrictions under the Clean Water Act.

The CITYgreen methodology did not allow for calculation of energy savings because of the building types prevalent in the study area. The percent tree canopy cover, however, is roughly proportional to the percent energy savings, up to 20% tree cover. Here, there is ample room for improvement, and a significant total dollar savings to be realized. While trees contribute a 5-9% savings for residential structures currently, an aggressive greening program could reduce energy bills by twice as much.

Wildlife values of current neighborhood conditions are low. Commercial areas are only suitable for the most tolerant urban wildlife, while institutions and residential areas are better. During field surveys, migratory warblers (songbirds) were observed in one institutional study site. While not approaching the wildlife values of wholly native sites, increased greening would make neighborhoods much more attractive to birds and butterflies. We will conduct further investigation on the bird usage of neighborhoods with different levels of tree, shrub and grass cover this winter, which will provide a method to assess the wildlife benefits of nature's services enhancements.

| | Pounds Removed Per Acre Per Year ($/lb) | | | | | | | | |
	O_3 ($3)	SO_2 ($2.45)	NO_2 ($6.90)	PM10 ($5.20)	CO ($1.50)	Tons carbon stored ($10/t)	Annual Savings	Cubic feet stormwater avoided ($275/cf)	Wildlife Index
Current									
Commercial	1.11 ($3.33)	0.09 ($0.22)	1.02 ($7.04)	1.29 ($6.71)	0.20 ($0.30)	0.013 ($0.13)	$17.73	738 ($202,950)	0.03
Institutional	5.04 ($15.12)	0.42 ($1.03)	4.63 ($31.95)	5.89 ($30.63)	0.91 ($1.37)	0.021 ($0.21)	$80.31	915 ($251,625)	0.10
Residential	4.49 ($13.47)	0.37 ($0.91)	4.12 ($28.43)	5.24 ($27.25)	0.81 ($1.22)	0.053 ($0.53)	$78.81	1728 ($475,200)	0.14
Scenario 1									
Commercial	3.26 ($9.78)	0.27 ($0.66)	2.99 ($20.63)	3.80 ($19.76)	0.59 ($0.89)	0.025 ($0.25)	$51.97	1921 ($528,275)	0.06
Institutional	8.26 ($24.78)	0.69 ($1.69)	7.58 ($52.30)	9.64 ($50.13)	1.50 ($2.25)	0.080 ($0.80)	$131.95	3413 ($938,575)	0.16
Residential	7.21 ($21.63)	0.60 ($1.47)	6.62 ($45.68)	8.42 ($43.78)	1.31 ($1.97)	0.085 ($0.85)	$115.38	3447 ($947,925)	0.18
Scenario 2									
Commercial	8.85 ($26.55)	0.74 ($1.81)	8.13 ($56.10)	10.34 ($53.77)	1.60 ($2.56)	0.104 ($1.04)	$141.83	8617 ($2,369,675)	0.13
Institutional	11.53 ($34.59)	0.96 ($2.35)	10.59 ($73.07)	13.47 ($70.04)	2.09 ($3.14)	0.116 ($1.16)	$184.35	10561 ($2,904,275)	0.24
Residential	10.33 ($30.99)	0.86 ($2.11)	9.48 ($65.41)	12.06 ($62.71)	1.87 ($2.81)	0.122 ($1.22)	$165.25	6689 ($1,839,475)	0.25

Table 2. Economic values of green infrastructure under current conditions and conservative and aggressive greening scenarios.

Many economic values of greening projects were not measured by the CITYgreen methodology. These include decreases in crime (Kuo and Sullivan 2001), lowered stress levels in residents, reduced symptoms of ADD among children (Taylor et al. 2001), better coping with stress among poor residents (Kuo 2001), and increased sense of community and community interaction. Further research might assign dollar values to these benefits that equal or outmatch the environmental benefits discussed here.

In addition to CITYgreen, researchers also developed a Normalized Difference Vegetation Index (NDVI) for the site. To do so, we obtained a multi-spectral SPOT image taken of the study area. The NDVI permitted researchers to make generalizations about the amount of greenery in the general study area without having to go out into the field and make measurements because the results of the specific studied sites could be tested against the NDVI information.

The NDVI value is from –1 to 1 and is associated with the amount of living vegetation in an area (Figure 4). The results clearly show the lack of vegetation in the study area. The highest NDVI values are 0.4, and are found in the de facto public open spaces, the Los Angeles Community College and the Barnsdall Art Park. A majority of the study site lacks any significant vegetative cover. In addition to confirming the results of our field studies (Table 1), we are using the NDVI as a means to extrapolate results from the subsites.
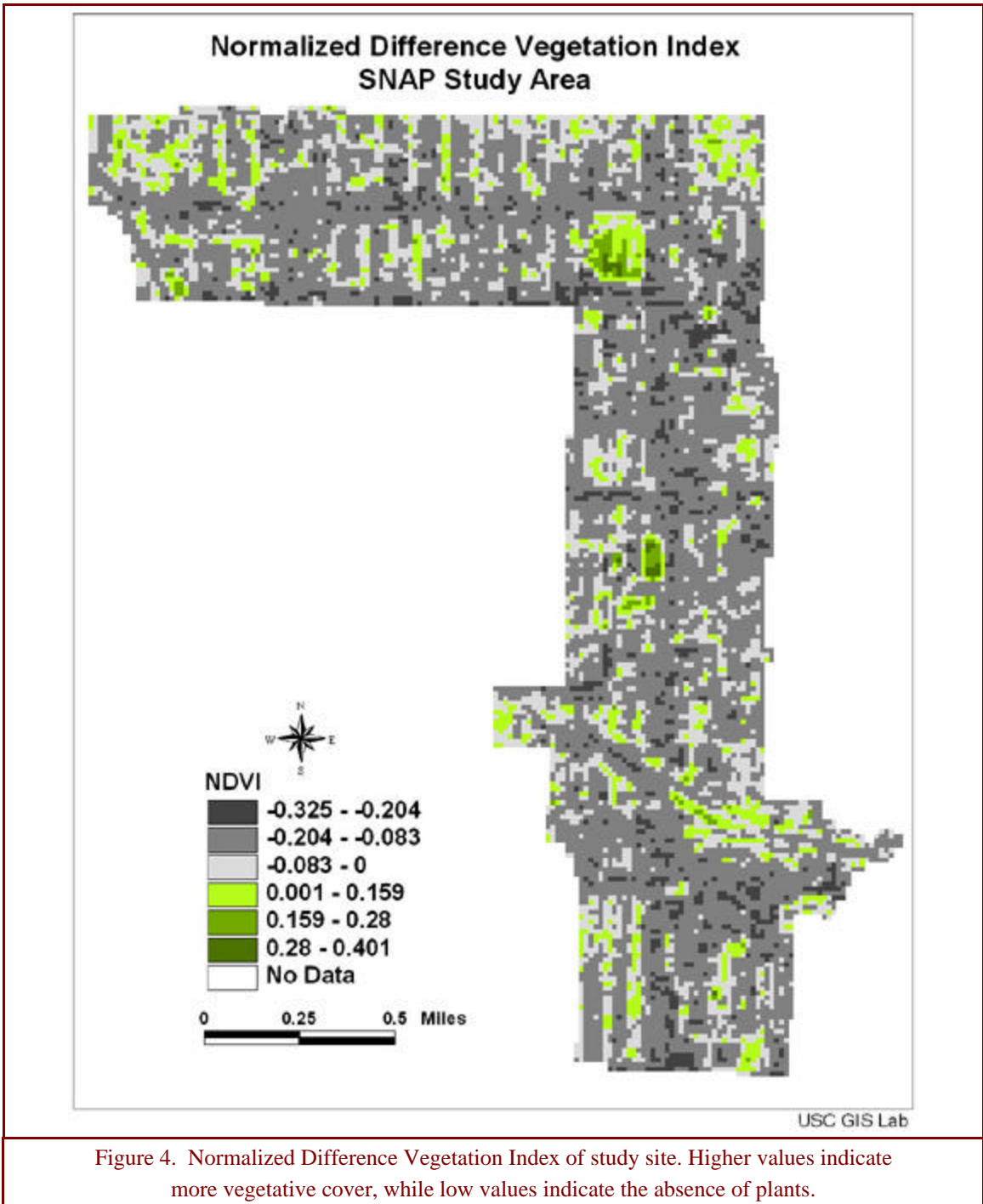
Figure 4. Normalized Difference Vegetation Index of study site. Higher values indicate more vegetative cover, while low values indicate the absence of plants.

NDVI has been used extensively for calculation of vegetative cover in rural and suburban areas and to calculate urban growth (Masek et al. 2000). Other techniques may better discriminate urban vegetation (Small 2001), but the ease of use makes NDVI attractive for extrapolation of our subsite results to the study area. The relationship of NDVI to greenspace was confirmed by completing a multiple regression of tree and grass cover against NDVI. NDVI values were smoothed by a 9-cell moving average to address registration inaccuracies between coverages. The regression was completed for all subsites together. Then, the entire study area was described by dividing NDVI values into four classes, and calculating the average of each

covervariable (trees, grass, buildings, shrubs and pavement) for each class. The total area of each NDVI class was calculated for the entire study area, and associated cover variables extrapolated from this classification. Energy savings, pollution removal, and carbon storage and sequestration are currently being calculated from the extrapolated cover variables for the entire study area.

Community Attitudes and Values toward Nature's Services

Understanding community values toward nature in the city is a critical aspect of developing appropriate and accepted new policies for renaturalization of existing dense urban neighborhoods. For Los Angeles and other cities in the Western U.S. that are experiencing demographic growth and densification this information is important as much of the growth is among immigrant populations, and densification is taking place in the neighborhoods they inhabit. Partly this is due to a lack of affordable new housing (Southern California Studies Center/Brookings Institution 2001).

Our researchers chose a focus group method as the most appropriate for learning of resident's attitudes and values. Focus group research methods were developed by sociologists as a technique to deepen their understanding of attitudes and to clarify mechanisms of attitude formation. This method can bypass some of the problems of survey questionnaires, and enable a deeper understanding of people's opinions, motivations and attitudes. In turn, such understanding can be used to develop better survey instruments. Psychologists most advanced the theory, enhanced in the 1960s by psychotherapeutic research on the characterization of personality types and on nonverbal aspects of group interaction. Focus group research permits the "pursuit of unconscious motivation and their application of probing techniques designed to expose those motives without altering them" (Goldman and McDonald 1987:3, 46). Participants feel more comfortable in a group (Basch 1987:434-435) that in individual interviews, and the group setting allows participants time to think about what is being said and can thus add or amend points. Discussion may spur other thoughts and memories and lead to contrasting perspective or consensus (Lofland and Lofland 1995:21). Stories that are produced in focus group discussions may also better reflect the social nature of knowledge than a summation of individual narratives exacted in interviews (Goss and Leinbach 1996:115). And because focus group discussions are 'socially situated communication,' group discussions can reveal how beliefs and convictions emerge from dialogical processes (ibid:4). They can enable people to make discoveries about their own condition through discussion with others, and thus serve as a learning and consciousness raising activity (ibid: 116).

Focus groups therefore demonstrate how people's thinking about issues can evolve through discussion at the focus group event itself. For example, in one focus group that included a broad range of age groups, youth comments about their use of open space informed older participants and influenced their subsequent comments. Further, several authors argue that the focus groups themselves potentially form a basis for empowerment for participants in the research process (Swenson et al. 1992: 463, Goss and Leinbach 1996:116-117). In the second round of focus groups, we found this beginning to occur, with one participant sending around a sign-up contact sheet so she could set up a meeting around the issues discussed at the focus group regarding renaturalization in their neighborhood. However, for empowerment to go beyond this type of effort, there would need to be more focus groups over an extended period of time.

Given that some residents had already been mobilized around the lack of open space in the Vermont corridor area by Councilwoman Jackie Goldberg, researchers were interested in learning not only what people thought and cared about, but how conversations among participants would evolve during the focus groups and whether they would lead to increased empowerment and sense of ability to change their conditions. Focus groups were the best approach to glean this type of information.

We also staged a Community Environmental Education Forum for focus group participants. The Community Environmental Education Forum was intended as a public forum for the whole study area, to present the concept of Nature's Services, the powers of analysis of CITYgreen, (how this GIS system worked), and to explain the political structure of the city to residents. Researchers also asked a community non-profit, Coalition LA, specialized in community electoral politics, to present the bureaucratic and service delivery structure of the city to enable residents to better understand which agency, department and elected official was responsible for various services residents received. The forum was conducted in the evening and attracted over 30 attendees. Childcare was provided, as were light refreshments. Researchers also administered questionnaires to all participants

We supplemented our focus group research with questionnaires at each of the meetings, and a random sample telephone survey in the study area. Findings from these approaches are discussed in later sections of the report.

FOCUS GROUPS & COMMUNITY ENVIRONMENTAL EDUCATION FORUM

Methods

The research consisted of eight focus groups, involving the following sets of participants:
- One (1) focus group with representatives from major nonprofit institutions and area employers;
- Three (3) focus groups with respondents drawn from the residential population of our three study area sites;
- A second round of three (3) focus groups with these same respondents, following their participation in a Community Environmental Forum; and
- One (1) focus group with area youth.

The first *institutional focus group* was held with professionals from local institutions to understand their attitudes toward nature in this area. Participants included representatives from a local hospital, middle school, non-profit, and local hotel. The *first set of resident focus groups* was designed to elicit attitudes and values about nature in the city, and information on park and open space usage patterns. These respondents (as well as other community residents) then participated in a *Community Environmental Education Forum* that aimed to introduce the concept of nature's services, CITYgreen analysis, local government service delivery, and to track the impact of this information session on focus groups participants. This was gauged at the *second set of resident focus groups* that followed the Forum. This round of sessions concentrated on participant's understanding of CITYgreen, their reactions to proposed greening scenarios, their own greening ideas and insights, and finally on strategies for change.

Resident participants were recruited by a community oriented non-profit partner, the California League of Conservation Voters Education Fund (CLCV Ed Fund), whose mission is to conduct and engage in community environmental education. We felt this would be an effective way to recruit participants since the Ed Fund had contacts in the area with community based organizations, and an Ed Fund employee might have better success at recruiting participants than the researchers themselves. The CLCV Ed Fund hired an organizer who recruited participants from the study area. Participants were required to commit to attending the two focus groups and a community environmental education forum, for which they would receive a stipend of $25.00 per meeting, or $100.00 for all three. All meetings were simultaneously translated into Spanish, provided childcare and light refreshments. Residents were restricted in participating to their own geographic area, corresponding to the CITYgreen study areas. A total of 24 participants were recruited and attended all three event. The audio of each event was recorded and the sessions were transcribed. All events were all conducted on a week day evening. Transcripts were then coded, with each statement being assigned to categories, and entered into a quantitative numeric program (NUD*ist) that allows researchers to query and classify statements according to topic and theme.

Questionnaires were administered at each of the focus group meetings and the community environmental education forum. These allowed researchers to learn participants' demographic profile and changes in perceptions regarding nature in the city over the course of their participation in the three events. The questionnaires probed computer ownership and type of utilization: word processing, spreadsheets, e-mail, internet research, GIS and other uses. This provided researchers with insight as to the computer literacy of the participants. These were entered into excel spreadsheets, allowing tallying of responses, revealing that focus groups and community education forum participants were evenly divided in terms of gender, were 50-60% Latino, with Armenian, White and African Americans making up the remainder. The average age of participants was 35-40 years, while individuals ranged from teenagers to residents in their 70s. Most were renters (75-85%) and 70-80% had children under 18 at home.

The *youth focus group* recruited 16 high school students living near the study area and was convened at Los Angeles' Belmont High School. The students who participated reflected the demographic composition of the neighborhood (94% Latino) and the school itself; of the 16 students, five were girls and 11 were boys. The focus group was held in the school library; the student's teacher and the director of the Multi-media Academy observed from a distance of several tables. To engage the students as much as possible, the interview sequence was designed to have three parts. First there was a set of warm-up questions lasting approximately 20 minutes to stimulate thinking about green space. Next, students went for a 10-minute outdoor experiential component to view green space on campus, which sparked more discussion. Finally, upon return to the library the focus group was completed with 15 minutes querying green space design ideas they would implement in their neighborhood. Each student received $20 for volunteering his or her time.

The Community Environmental Education Forum, held between the two sets of community focus groups, provided an opportunity for researchers to introduce and explain CITYgreen in detail. We demonstrated how the GIS program worked, how to use it, and some results from the study sites. We were interested in learning if CITYgreen, hence GIS technology, might prove valuable to residents in better articulating the case for enhancing nature's services in their neighborhoods as we had learned in the first round of focus groups that they well understood nature's value. GIS can work with many traditional and novel sorts of knowledge, effectively combine disparate types of planning data, and help people visualize a range of

potential outcomes. A key to GIS's success in participatory planning is its capacity to enhance the existing spectrum of tools in the process. New organizations such as the International Association for Public Participation have recently emerged to develop and disseminate information on public participation. GIS use has become widespread and its use in public forums seemed important. At the same time, its use for public participation has also come under criticism for a number of reasons, including representation and elitism due to the need for expertise to create, and maintain GIS, as well as the expertise needed to use such systems. Further GIS systems are often expensive and time consuming to utilize.

Focus Group Results

Even in the very first focus groups, participants showed an understanding of the ways in which trees contributed to improving the urban environment by cooling the atmosphere, serving to buffer noise, absorbing air pollution and contributing habitat for wildlife. They did so before researchers even broached the topic of nature's services, discussion of which was reserved for the second round of focus groups, after the Community Environmental Education Forum. This is consistent with recent polls that have shown strong Latino support for environmental protection and parks. In the 2000 elections, 74 percent of Latino voters approved Proposition 40, a $2.6 billion park and open space measure. In contrast, 56 percent of White voters approved it. Additionally, the strongest support for the parks measure, 75 percent, came from households earning less than $20,000 a year (Rogers 2002). Largely overlooked by researchers interested in race, class, or ethnic differences in leisure activities, such strong support for environmental protection and for parks among Latinos, seems important to acknowledge and understand.

In the first round of focus groups, participants representing local institutions noted the lack of open space in this area, commenting that people gravitated even toward the most modest greened spaces, such as trees located in heavily trafficked areas (such as along a parking strip) even though they might be surrounded by traffic. The local middle school administrator mentioned that teachers often went outside to correct papers preferring even a bit of a shady tree over sitting in the faculty room. Overall it was recognized that compared to the places where they resided, this area as sorely lacking in parks and open spaces.

Residents expressed strong feelings regarding the lack of green space in the first set of focus groups where we probed attitudes and values toward open space, and park and open space usage patterns. They told of Griffith Park's over crowding (turning cars away on weekends), and perceived dangers in MacArthur Park, another large park in the general area. When asked where people went for parks and open space, answers varied, though Armenians cited shopping malls, and expressed interest in more greened commercial strips as desirable additions to the neighborhood. One young woman said she went on rooftops to experience open space. Most participants, however, simply felt there was no place to go locally and that, since transportation options were limited, children ended up either watching television inside, or might go sit on a curb to watch cars go by just to get outside. Overall, residents felt strongly disenfranchised with respect to the urban green compared to more affluent neighborhoods.

The second round of focus groups was oriented toward probing resident's understanding of CITYgreen, reactions to the various greening scenarios presented (see Figure 5), and to exploring greening options, their feasibility and potential consequences with residents. In discussions about GIS, nature's services and sustainability, participants were generally able to

recognize their local neighborhoods on the digitized maps used in CITYgreen. But residents were hesitant to discuss the details, especially the analyses produced by the program. They reacted positively to the increased-green proposed in scenarios and the resultant changes offered by researchers, but were reluctant to work with or suggest alternations to them. They were uncertain about what the CITYgreen results meant and how they related to the actual trees, grass, and other vegetation. Further, there was some confusion between GIS and GPS – Global Positioning Systems.

On the other hand, participants were consistently enthusiastic the when street level photos of their neighborhoods were shown, that had been re-touched in PhotoShop. These illustrated the types of changes the CITYgreen scenarios portrayed abstractly from above (eg: comparing Figure 3 to Figure 5).   There were even gasps at the transformation that could occur on an ordinary street in their neighborhood, merely as a result of tree planting and changing parking to create a few bumped out greened spots. We essentially presented a simple version of a street, or linear park, inspired by the Dutch Woonerf concept. Such features as more shrubs, grass, and angled automobile parking appeared in these new photos of their streets, and participants eagerly embraced the suggested changes while the CITYgreen generated values of nature's services for environmental improvement, while implicitly understood, seemed less interesting to participants.

It was evident to researchers that for this group of individuals at least, visual images of before and after were far stronger communicative and empowerment tools than CITYgreen GIS analysis.

Focus group discussions about urban greening strongly point to the need for urban park and recreation policies to evolve to meet the needs of residents in dense urban areas, in ways that also enhance their daily quality of life – not simply as recreation or leisure destinations. Thus, providing naturalized environments – tree lined streets, landscaped streetscapes and pedestrian corridors along "necessary journeys" such as walking to a bus or metro stop, to school or the store, should also be part of how the city approaches its parks, recreation, and open space provision. Residents expressed a strong desire for these natural services. Yet at the same time, residents were realistic about the obstacles to greening their local environment, to planting trees on their streets. There was quite a lot of discussion about the long-term problems of maintenance, including the maintenance and safety of any new small spaces that might be created.

Participants, however, expressed deep skepticism about the political will by the City to improve their neighborhoods since many of the residents were low-income immigrants with little or no political clout. In all focus groups, participants turned to the facilitator for assistance and guidance for change, though at one focus group a participant passed out a sign-up sheet so she could call a meeting together to pursue the ideas we explored together. This points to a significant lack of political empowerment and knowledge of local government by these residents.

Overall, people in this hardscaped environment felt deprived of urban greenery and of accessible open space, not only for traditional park and recreation uses, but also in daily life's necessary journeys. There appeared to be a willingness to entertain significant urban infrastructure changes to increase open spaces to enhance tree canopy, and create places where people could go to get out of their crowded and hot apartments. This points to the potential for introducing and finding support for a nature's services approach to the most dense urban areas in cities where there is a concentration of low income immigrant

communities, and where access to nature is missed as an aspect of daily life, not simply as a special leisure destination.

| Existing | Greened Visualization |

Figure 5. Examples of Photoshop greening scenarios of neighborhood sites.

At public input forums addressing the issue of park inequity, adult residents often point to a need for recreation-oriented parks for children and teenaged youth. We found a similar desire for more open space among youth. In the exclusive youth focus group (using the same set of questions), participants envisioned different green spaces than adults, with a marked preference for multiple use spaces for socializing, playing or relaxing, and enjoying green space. They demonstrated a keen interest in local parks, had an awareness of a variety of maintenance issues in different park contexts, and expressed concern for personal safety in existing parks. As for specific recommendations, they envisioned transforming a nearby graffiti-covered, abandoned railway tunnel into a park for socializing and relaxing. They also thought that planting alleyways would make residents care about them, transforming them from places of danger to places of local pride. Adults did not respond to the greening of alleyways as much, most ignored the question when posed. One student also commented, garnering agreement from the group, that enough parks were available, but they needed maintenance.

The experiential component, walking to look at green space on the campus, was particularly helpful in stimulating discussion, as well as providing a break from the formality of the inside discussion group.

The results of the questionnaires administered at all of the events revealed a great deal about the digital divide that existed in this neighborhood (see Table 3). GIS requires a fair degree of computer competence and sophistication; it also requires training. At the one focus group comprised of professionals from local institutions, questionnaires revealed computers were integral to their work, and 57% used them for graphic and maps, yet only one participant had actually used a GIS. The others were familiar with GIS systems and everyone's use of computers was in analytic modes, similar to the uses of a GIS. By contrast the resident participants in the other focus groups who used computers – 77% – used them for word processing and e-mail, extensions of standard communication, not analytic devises.

Telephone Survey

With the assistance of a professional telephone survey company (which donated its time) researchers administered a multi-cultural telephone survey to find out if focus group results held more generally amongst a representative sample. We included several questions to determine environmental literacy, since our focus groups with largely Latino immigrants showed high understanding of nature's services. Additionally we wanted to learn about computer access, given our interest in PPGIS. We also probed park usage and the value of parks and open spaces to people in their daily lives. Our results show remarkable consistency among focus group participants and the residents surveyed by telephone.

Ninety-six telephone surveys were administered to residents within the study area by the multicultural polling firm. Surveys were translated into Spanish and Armenian, the two most prevalent non-English languages spoken in the area. The surveys were stratified to ensure a statistically significant sample of Latino and Armenian residents. (Table 3). Although more women than men responded, sample sizes were sufficient to allow for comparisons. Two-thirds of respondents reported that they did go to parks. The frequency of those visits was bimodal; 30% visit parks every week, while 34% visit parks rarely. Cars are the most frequent mode of transportation to parks (64%), followed by walking (33%) and public transport (7%). (Some respondents reported using more than one mode of transport.) In addition to parks, open space used by residents included the street/sidewalk, mall, school, and work. Mode of

transportation provided some explanation of the frequencies of park visits. Those who reported walking to parks were much more likely to go once a week, while those who did not walk, were much more likely to go rarely. Testing the frequency of park use by those who reported driving showed the same relationship. Those who drive to parks report weekly use far less than those who do not drive. Use of public transportation to access parks is associated with infrequent (once a month), but not rare, park use.

Park use is negatively correlated with age in a logistic regression (r^2=0.11, p<0.0002). Older residents use parks less, even when ethnicity is controlled for. However, older residents were more likely to walk to the park when they do go, and may visit frequently.

Values given to open space were recorded on a five point ordinal scale. These values were uniformly high; 89% felt that access to open space on a daily basis was very important or important. Uses of open space ranked by percentage of residents citing it as very important were: place for children to play (85%), sports (73%), trees, flowers (73%), places to meet (68%), and community gardens (67%). While women and men did not differ significantly in these attitudes, Latinos uniformly responded with higher expressions of importance than Armenians for all features of open space except one (a place to meet). These differences were not statistically significant however, and the explanatory value of ethnicity in explaining attitudinal variation was quite low.

In a short quiz to test environmental knowledge, respondents correctly answered 3.29 of 4 questions. Males and females did not perform significantly differently, while Latinos scored significantly higher than Armenians (r^2=0.4; p<0.0001). Older residents scored lower as well, but stepwise multiple regressions showed that this was an artifact of ethnicity – Armenians were on average older than Latinos. Interestingly, Armenians almost all missed the same question, a true-false question about the urban heat island effect. There may be culturally based explanation for why Armenians responded that the countryside is hotter than central cities.

The presence of children in the home was correlated with several responses. Respondents were significantly more likely to respond that they go to parks if children were in the home (r^2, p < 0.0001). Those with children in the home also expressed a higher value for access to open space every day (p<0.02), as well as higher scores for each open space use.

In response to questions about computers, we found relatively low diffusion of the technology into homes in the study area. Sixty-six percent of respondents did not have access to a computer at home. Those who did have computers used them predominantly for email, browsing the web, games, and word processing. Knowledge of geographic information systems was even lower, with only 7% of respondents aware of the technology. Of those, 2 had learned about it at work, 2 from school, one from a friend, and one from television.

Despite the analytic gap between the focus group residents' and the focus-group professionals' use of computers, the former were far more computer literate than the study area residents as a whole. The telephone survey revealed that only 34 percent of 96 interviewees have access to a computer at all. Thus the potential for successful public participation GIS, from the results of this study, seem limited given the knowledge and time required to use GIS systems, as well as their cost; even new web-based applications that are user-friendly may not penetrate neighborhoods with such low computer and Internet access. Useful as a tool by experts to generate information, GIS remains limited in its community accessibility and utility for empowerment.

Overall, however, responses to our telephone survey showed great interest in urban greening, parks and open spaces as well as awareness of nature's services in the city.

	First Focus Group (n =22)	Community Meeting (n = 19)	Second Focus Group (n = 18)	Surveys (n = 94)
Average age	35.2	40.3	40.2	47.6
Males/Females	11/11	10/9	10/8	30/64
% Latino	64	53	61	37
% White	14	21	17	2
% Armenian	9	5	6	54
% Renters	81	72	75	91
% with children in home	77	68	83	37
% with access to computer	77	83	67	34
% who rank daily access to open space highest	71	62	88	89
% who walk to parks	31	26	33	32
% who use parks weekly	45	26	41	23

Table 3. Selected characteristics of focus group, community meeting, and telephone survey participants. More participants were involved in each of the focus groups and community meeting but only complete questionnaires were scored. Because phone surveys were stratified by ethnic origin, they do not reflect the actual proportion of each ethnic group in the study area.

RESIDENTIAL HOUSING TRANSACTIONS: A GIS ANALYSIS

A number of studies across the country have shown that green cover in neighborhoods increases property values (Garvin and Berens 1997, Brabec 1992, Myers 1997, Lockwood 1996, Natural Park Service, Rivers, Trails and Conservation Assistance Program: 1995, Correll, et al. 1978). As an additional way to value nature in the city, we tested whether even in the study neighborhood, which is largely immigrant and poor, whether single-family house sale prices were higher in places where there was more green cover. The results of our analysis showed that the magnitude of the green cover effect on price is relatively large, and in a dense urban neighborhood, such as the Vermont area, this effect can be stronger than lot size itself.

Methods to ascertain correlations between green space and housing prices were based on the use of two ESRI Geographic Information System products. Methods were multi-layered, and though not difficult, required manipulation of data to arrive at conclusions. GIS programs were used to analyze base house sale data along with greenspace information derived from aerial photography to create green cover variables for a hedonic price model. The hedonic price model was then used to estimate the relationship between greenspace and real estate value.
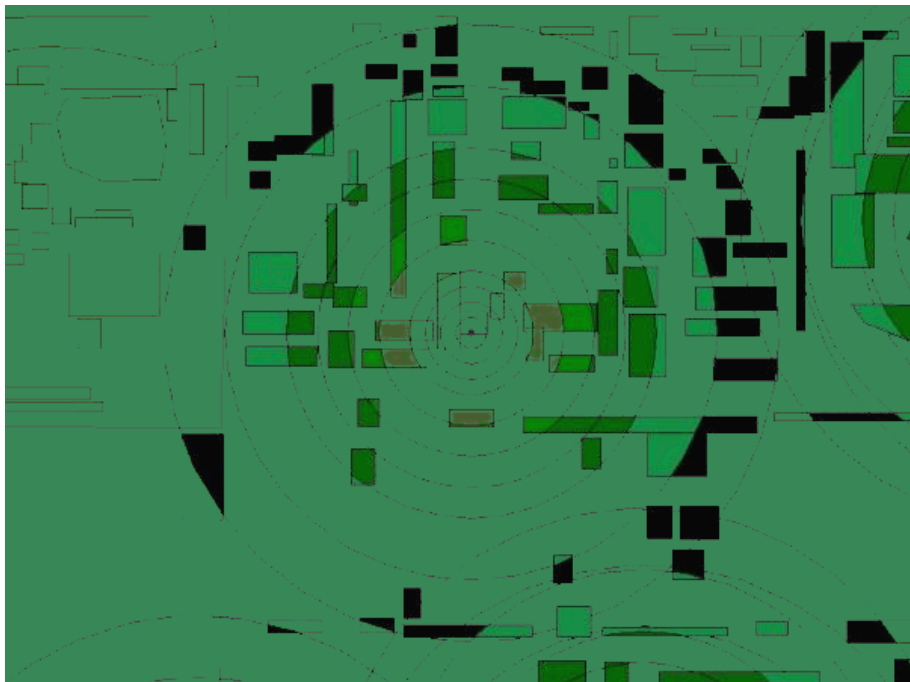

Figure 6. Green cover and buffers surrounding single-family house in study area.
Buffers at 25, 20, 75, 100, 150, 200, 250, 300, 400, and 500 feet.

Approximately 260 sales of single-family residences in the Vermont study area from January 1999 to June 2000 were used. (Figure 7) These data were purchased from American Real Estate Solutions in Anaheim and include information from the Los Angeles County Assessor's Office, such as the recording date and sale price of the house, as well as characteristics of the house, such as lot size, building area, number of rooms, year built, quality and condition. (Table 4)

Sale price	$237,500
Living area	1,596 sq. ft.
Lot size	6,750 sq. ft.
Age of house	79 years
1990 household income	$23,690
Distance to freeway ramp	0.66 mile
Distance to park/recreation area	0.40 mile
Green space in 500 foot radius	3.4 acres (19% of total radius area)

Table 4. Median summary measures for house sale transactions (Conway 2002).

The estimated coefficients on green space from our research on hedonic pricing models indicate that an 11 percent increase in the amount of green space within a radius of 200 to 500 feet from the house leads to an approximate increase of 1.5 percent in the expected sales price of the house or an additional $3,440 in the median price.
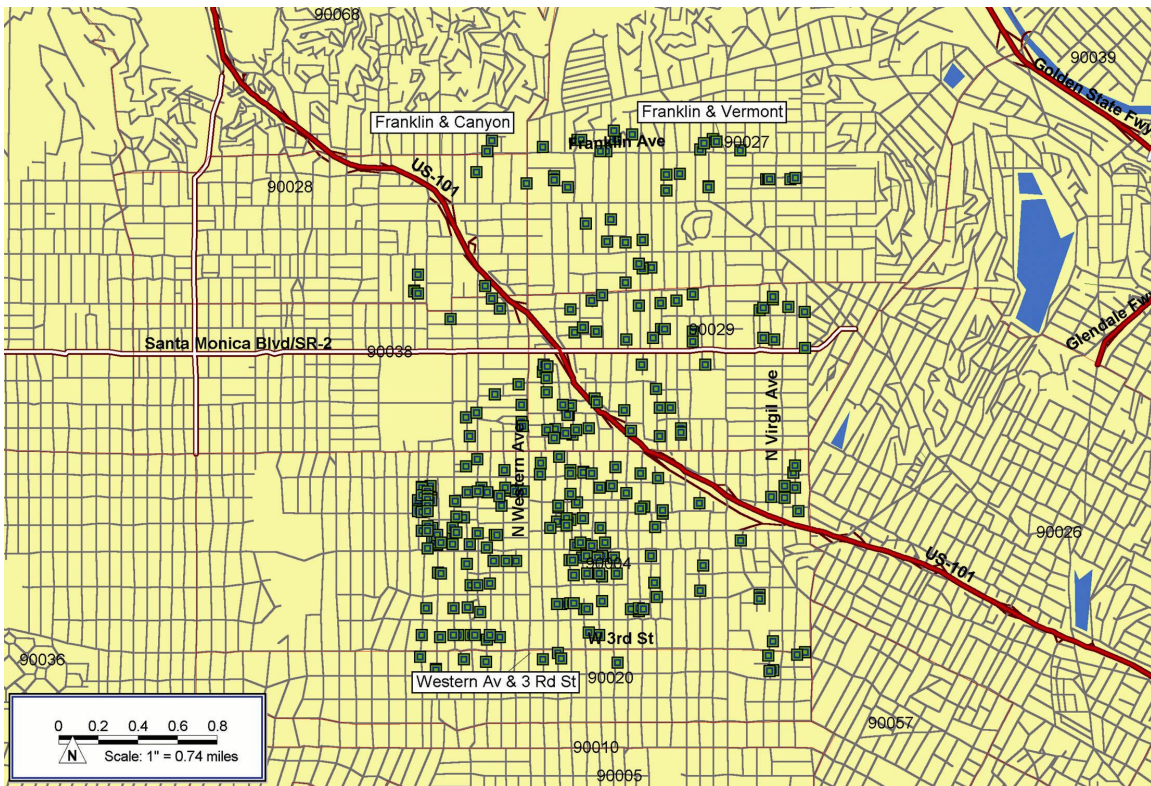
Figure 7. Map of house sale locations in study area (Conway 2002).

Results show a potential benefit to the city. For example, the estimated economic impact of an 11 percent increase in the green space is equivalent to approximately 1/3 acre or about the size of a small park. Given the cost of vacant lots in the area, a small park parcel would cost roughly $200,000 to purchase. However having the green space would increase the expected sale price by 1.5 percent for approximately 300 houses in the vicinity of the park. Because approximately 20 percent of the houses in the study area tend to sell each year, the additional green space would yield an approximate $1million property value increase over 5 years. Additional property tax revenues from this increased value are about $13,000 per year. As a result the small park cost could be paid form the increased tax revenues in about 15 years with no new taxes.

Naturally, one question would be whether gentrification would occur if these areas had more parks and greened areas, and would need to be addressed. Moreover, these property value increases are measurable for single-family dwelling transactions. Much less is known as to whether there is a correlation between property values of multiple family dwellings and greening. These are topics for further investigation. Similarly, more investigation remains to be conducted to understand the implications of green cover for other types of land use, most especially retail land uses such as strip malls, or big box retail such as grocery stores. Researchers suspect that like homeowners, apartment owners and businesses may also benefit from greening programs, in which case this might provide incentives for Business Improvement Districts (BIDs) to self-finance efforts to enhance commercial streets.

Using information on the distribution of existing parks in the City of Los Angeles and census data, our research team conducted a statistical analysis of access to park space enjoyed by children and youth, and by residents according to their race/ethnicity and socioeconomic status (Table 5). Further, a mapping of city park bond funds revealed the extent to which the distribution of Proposition K funds has increased access to parks for residents. The bond measure to fund additional parks was passed in 1996, when Los Angeles voters passed Proposition K (the Citywide Parks, Recreation and Community Facilities Assessment Referendum Ordinance), to increase and enhance park and recreation space in the city, in part as a response to the growing acknowledgment and concern about the lack of parks in the City. (For the full report, see the Parks and Park Funding in Los Angeles: an Equity Mapping Analysis report http://www.usc.edu/dept/geography/ESPE/parks.pdf)

Proposition K generates $25 million per year for acquisition, improvement, construction and maintenance of City parks and recreation facilities for 30 years through a real-property tax assessment (a total of $298,850,000 over its lifespan for 183 designated projects and $143,650,000 competitively). Its fundamental purpose is to address the inadequacies and deterioration of the City's "youth infrastructure" – parks and recreation centers. Additionally it is to meet the unmet need for park, recreation, childcare, and community facilities. Although a few projects were specified for funding in the language of the proposition itself, much of the bond funding is allocated through a competitive process in which community-based organizations as well as city agencies and other public entities, may submit requests for funding for park improvement projects, park land acquisition and recreational and other activity programs

Dominant Group		Total Population	Population Density (persons/ sq. mi.)	Children Under 18	Park Acres per 1,000 Population	Park Acres per 1,000 Children
White	>75%	477,482	5.1	16.5%	31.8	192.9
	50–75%	560,472	8.2	18.6%	12.2	65.7
	<50%	258, 717	13.9	20.4%	2.1	10.1
Total		*1,296,671*	*7.2*	*18.2%*	*17.4*	*95.7*
Latino	>75%	770,471	24.0	34.7%	0.6	1.6
	50–75%	1,019,460	18.4	31.8%	2.6	8.2
	<50%	281,113	15.7	25.3%	0.9	3.7
Total		*2,071,044*	*19.7*	*32.0%*	*1.6*	*5.0*
African-American	>75%	49,314	16.0	26.8%	1.7	6.3
	50–75%	139,455	20.1	30.2%	0.7	2.4
	<50%	45,217	21.6	21.5%	0.1	0.4
Total		*233,986*	*19.3*	*27.8%*	*0.8*	*2.9*
Asian-Pacific Islander	>75%	5753	23.0	17.7%	0.3	1.9
	50–75%	32,180	25.0	19.7%	0.6	3.3
	<50%	60,011	20.8	18.8%	1.6	8.4
Total		*97,944*	*22.1*	*19.0%*	*1.2*	*6.3*

Table 5. Park characteristics of neighborhoods by dominant race/ethnic group.

Researchers used information on Los Angeles City park and recreation facilities, supplemented by the Thomas Brother's Guide and field checks, to determine where existing facilities were located. Then with the use of GIS, sites were mapped, and a 1/4 mile radius buffer around each park site was created to determine accessibility to local populations (Figure 8). Ethnicity and socioeconomic patterns were mapped from census data (Figure 9). We then used data on Proposition K funding provided by the Commission on Children, Youth and Their Families (that oversees Prop K funds and determines their distribution) to map the distribution of Prop K funded projects in the City (Figure 10).
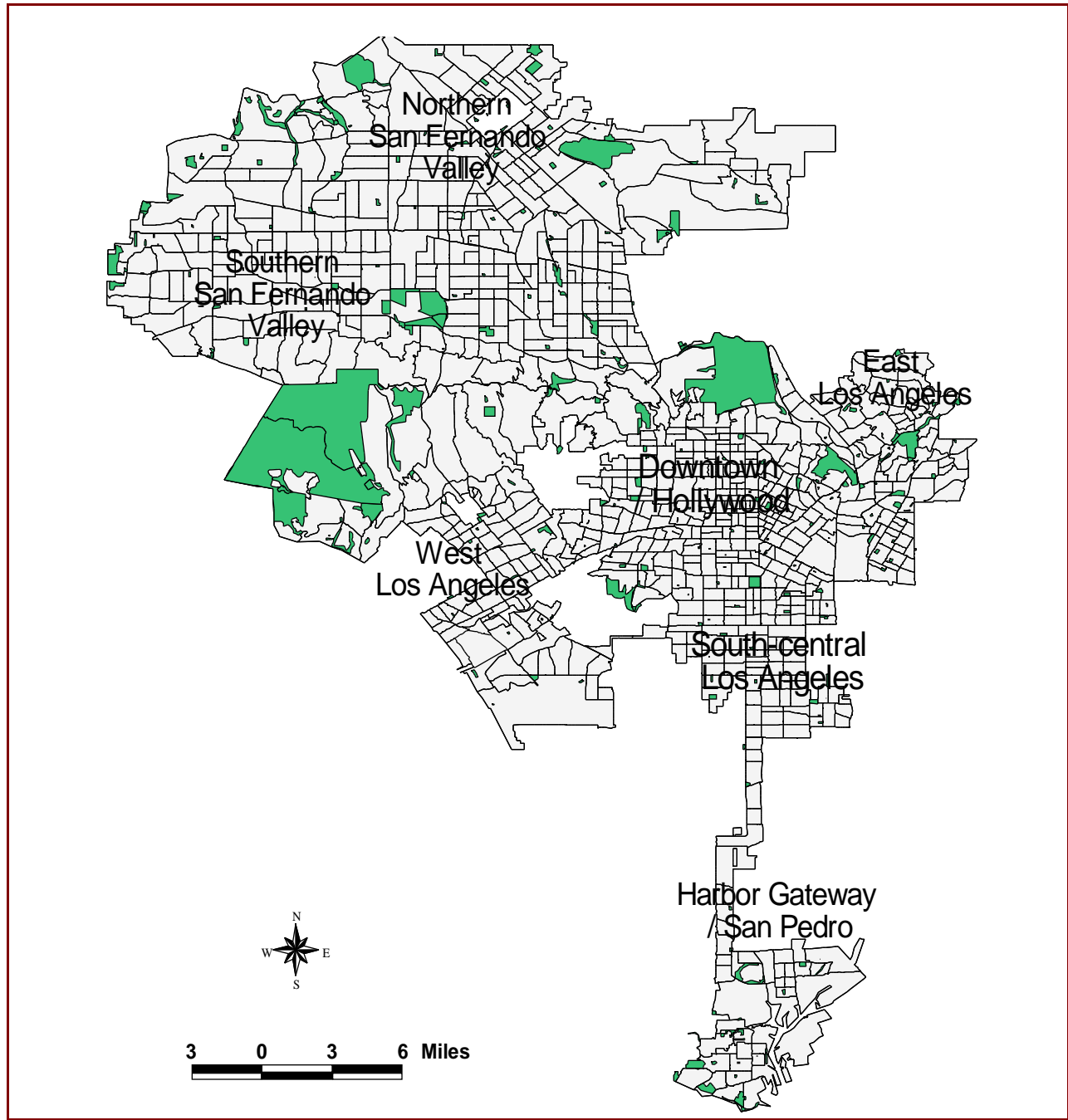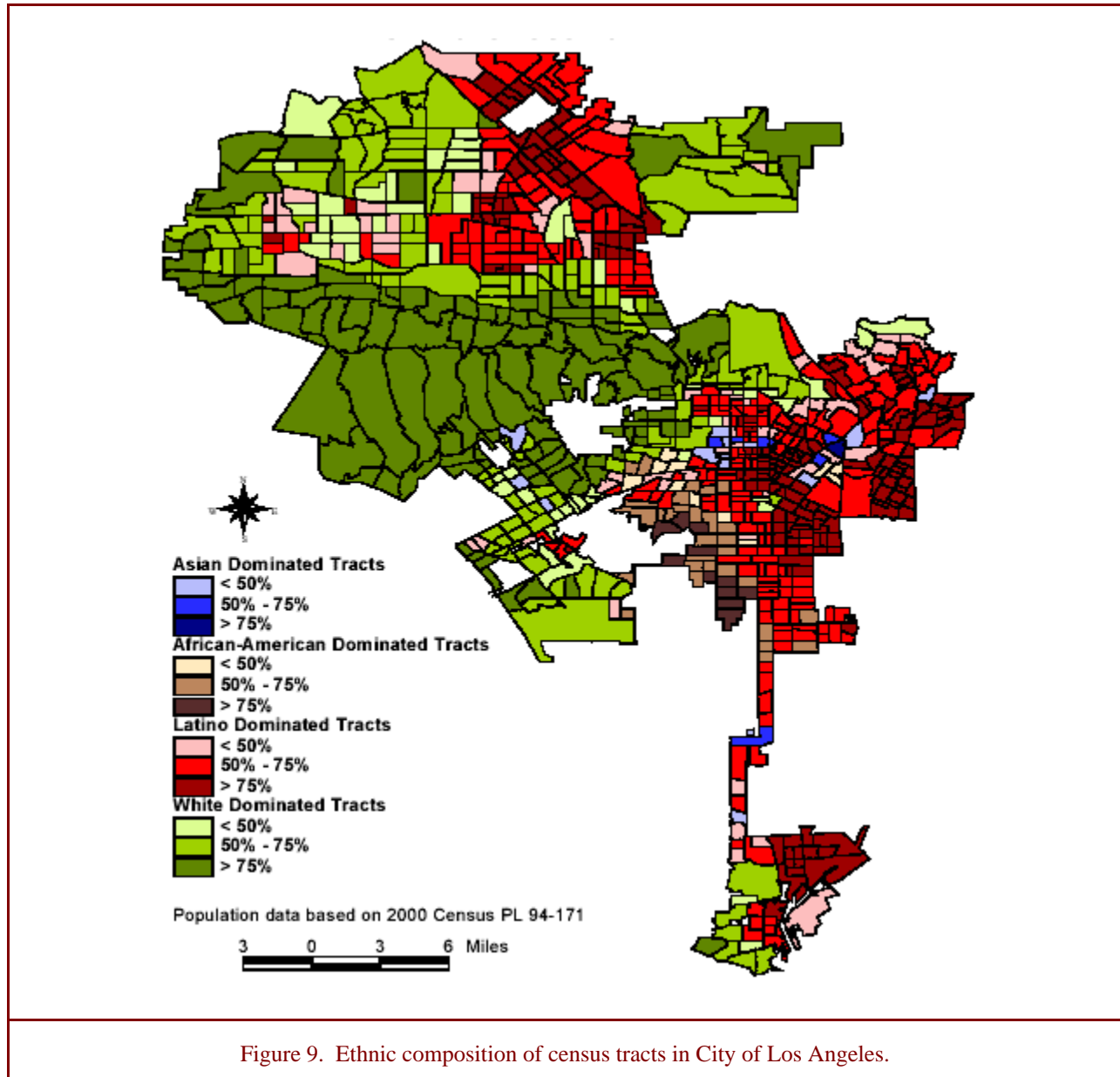

Figure 8. Location of parks and open space in City of Los Angeles.

Figure 9. Ethnic composition of census tracts in City of Los Angeles.

The analysis revealed that:

- Low-income and concentrated poverty areas as well as neighborhoods dominated by Latinos, African Americans, and Asian-Pacific Islanders, have dramatically lower levels of access to park resources than White dominated areas of the city (Figure 10);
- Proposition K funding patterns often exacerbate rather than ameliorate existing inequalities in park and open space resource distributions in the City of Los Angeles since much of the funding was largely invested in improvements to existing facilities, serving as a supplement to the City's Recreation and Parks department
- Neighborhoods with the largest shares of young people received half as much Proposition K funding on a per youth basis than areas with the least concentration of youth;

- Districts with the highest rates of park accessibility received as much or more bond funds than many area with higher poverty, higher concentrations of young people and below average park accessibility.
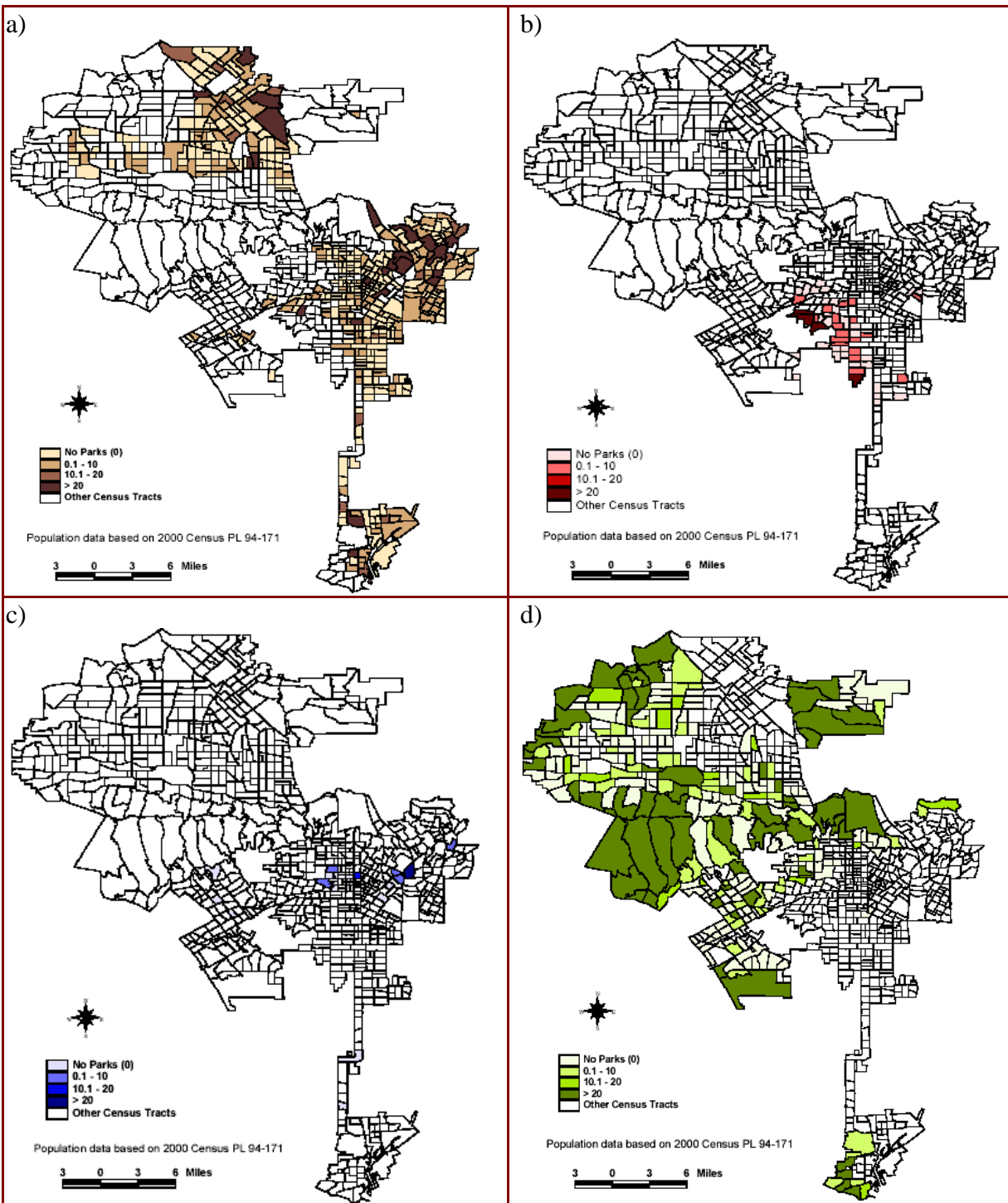

Figure 10. Number of parks in census tracts classified by dominant ethnicity:
a) Latino, b) African America, c) Asian, and d) White.

TOWARD A SUSTAINABLE LOS ANGELES: A "NATURE'S SERVICES" APPROACH

Our analysis suggests that much of the $25 million a year the measure generates was not allocated to areas where it is most needed, during the 1998-2000 period. Although Prop K funds were disproportionately allocated – in absolute and per capita terms – to areas with a larger share of youthful residents, allocations would have had to be even more targeted to such neighborhoods to achieve equity on a per child basis. Low-income and concentrated poverty areas, as well as neighborhoods dominated by Latinos, African Americans, and Asian-Pacific Islanders, endure dramatically lower levels of access to park resources than white dominated areas of the City (for example, see Table 5). In part this result is due to the fact that white dominated areas are located on the edge of the Valley and LA Basin, and thus close to large regional parks. Yet across the board, less than 30 percent of the City's population has easy access to park space. Thus a serious problem of park access confronts a vast majority of young (and all age groups) in Los Angeles. Our research shows that Prop K, a clear recognition by the citizens of the City of the need for more urban parks for youth, has thus far been spent on the improvement of existing parks, with only a handful of investments in new properties.

These findings point to the need for greater urban greening, the creation of additional new park spaces in low-income and concentrated poverty areas that are dominated by Latinos, African Americans, and Asian-Pacific Islanders. Obtaining new land is bureaucratically complicated and expensive, and such areas often have no large tracts of land within them. However, such areas often contain a variety of remnant lands. Taking a nature's service and small park and open space approach could significantly contribute to improving access to open space in these underserved and disadvantaged parts of the city.

		Population within _ Mile Buffer	Number of Children outside _ Mile Buffer	Park Acres/1,000 Population within _ Mile Buffer	Park Acres/1,000 Under 18 within _ Mile Buffer
1990 Median Household Income	>$40,000	20.8%	136,595	102.9	517.0
	$30–40,000	20.4%	146,679	28.1	129.6
	$20–30,000	27.7%	195,991	5.0	17.7
	<$20,000	29.9%	160,353	1.6	5.2
1990 Percent in Poverty	<10%	21.4%	40,802	86.8	451.5
	10.1–20%	20.6%	250,772	9.2	39.1
	20.1–40%	29.2%	175,292	3.9	12.8
	>40%	36.5%	172,752	2.8	7.7
Total		*24.8%*	*639,618*	*29.6*	*113.1*

Table 6. Socioeconomic status and access to parks.

Urban Land Institute Recommendations

On April 13, 2002 a panel of experts assembled by ULI came together for the day to advise the USC research team on criteria for creating and maintaining a successful approach to enhancing nature's services in the Vermont/Western study area. The panel toured the study area at the beginning of the day, and then returned to USC for a day's discussion.

The panel identified the following principles that could be applied in the study area.

- **Affirm the importance of the cause**. Los Angeles has grown out of its suburban past and is now the second densest region in the United States. "Greening" of any neighborhood in Los Angeles improves the quality of life of its residents. To be successful, any endeavor needs leadership, enthusiasm, and creativity to see the urban fabric of this city differently. If the civic leaders deem the cause to be worthwhile and important enough to generate such support, they as implementers will overcome the challenges faced. The panel recommended the positioning of greening the study area as an important civic priority.
- **Provide inspired, goal-oriented leadership**. Given the complexities of accomplishing even a small demonstration greening project, the importance of leadership cannot be overstated. Councilmember Eric Garcetti in District 13 and his staff, (like their predecessors) have already committed themselves to this process, but strong leadership from City Hall is needed. The panel recommended further commitment by and cooperation with the Mayor's office and all concerned departments.
- **Involve a coalition of community partners.** Parks and interstitial green spaces touch the lives of many stakeholders who need to be involved in planning, design, and management.
- **Build upon success**. Because of all the complexities and hurdles, the panel recommended a focus on a few small and relatively straightforward demonstration projects for implementation.
- **Engage the public sector in advance**. Active involvement of numerous public agencies in supporting the leadership and demonstration "greening" projects will be critical to successful implementation. A "unified" culture is essential to success.
- **Change the paradigm**. The current process for the approval of greening projects is far too complex, uncoordinated, and cumbersome to expect either non-profit or private sector actors to persevere in pursuing a greening project. Ways to change the existing approval process range from creating an ombudsman to facilitate the process, to creating a new agency whose mission is urban greening and which would coordinate projects and approvals, to reducing the number of agencies with regulatory oversight.

It was clear from the participation of the professionals in the daylong workshop, that there is a great deal of knowledge regarding how to implement a nature's services approach in the development community. The lack of such an implementation has far more to do with a non-responsive government structure, a lack of incentives and leadership for change.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The findings of this two-year project analyzing the potential of enhancing nature's services in the City of Los Angeles to make it more sustainable clearly demonstrate that there are myriad opportunities in even the densest part of the City to renaturalize the urban fabric. The research showed there are significant economic, social, ecological and environmental reasons for establishing new programs that would transform small interstitial spaces into greened open spaces, most particularly in parts of the city that are significantly park poor. Renaturalization would substantially and measurably contribute to improving the environment through the reduction of air pollution, the reduction of stormwater flows and urban runoff, the cooling of the ambient environment and the provision of habitat for wildlife. Moreover, such an approach, using small interstitial spaces, alleyways, vacant and abandoned parcels for small parks, gardens, plazas and public open spaces, creating linear parks along streets, using strip mall open spaces and parking lots to make permeable spaces and utilizing other

neighborhood level spaces for greening would not only be enthusiastically embraced by local residents, but would also increase property values and help redress the historic inequity in park distribution in the City.

We found substantial "indigenous" knowledge about the value of nature in the city already held by residents, and a deep feeling of disenfranchisement with respect to the urban green compared to wealthier neighborhoods. People were openly enthusiastic when showed the potential for the provision of additional nature's services based on greening scenarios. Politically, a nature's services greening program – using small available open spaces in dense neighborhoods, would be successful for local officials and for park advocacy stakeholder groups.

While the professionals who participated in the Urban Land Institute daylong workshop identified serious institutional obstacles to implementing a nature's services approach, participants also agreed that with proper leadership from the Mayor and City Council, the obstacles could be overcome. Obstacles that were identified were largely ones of process: many agencies must approve plans for land use change, and give permits. General consensus indicated that there were no major legal or regulatory obstacles to developing small greened spaces in neighborhoods, or even transforming non-arterial streets into "shared streets" based on the Dutch Woonerf principle. These seemingly small spaces, compared with conventional neighborhood parks of several acres, are, in fact, more realistic in terms of park policy for 21st Century Los Angeles. Los Angeles is no longer suburban in many of its neighborhoods, and the provision of parks, recreation, and open spaces must evolve to the urban characteristics of the City. While Los Angeles is not Manhattan, Paris, or London, it too is in need of park spaces that are accessible by foot in neighborhoods that are dense, and that today have no parks. Moreover, it is no longer feasible to destroy housing to create parks given current housing shortages and existing rates of overcrowding. Instead a new approach should be taken that starts with the premise that the open spaces that exist, in their multiple forms, offer the opportunity for providing public open space that at the same time ameliorates the city's own environmental impacts. This would result, essentially, in transforming what is now often considered wasted space, nuisance space or non-economically viable space, into productive, useful and attractive vegetated places, thereby also beginning to build a green infrastructure for the City.

Green infrastructure can also save money. Less storm water and urban run off makes it easier to meet new regional TMDL requirements. It can be part of a larger holistic approach to water management in the region where water is no longer wasted by sending it directly out to sea, but encouraged to percolate back into the ground by providing many permeable surfaces for it to do so. Green infrastructure can also help reduce health care costs. Trees mitigate air pollution and cool the atmosphere. More trees can help reduce localized air pollution and therefore reduce asthma and pollution related health problems. By cooling the atmosphere, there will be less need for air conditioning, reducing energy costs. And for those who cannot afford air conditioning, or don't have it, the ambient temperatures will be lowered, increasing physical comfort and well-being. Thus green infrastructure can and should be another element of the City's existing infrastructure, just like storm drains and power lines. It is unquestionable that green infrastructure provides measurable benefits in ways similar to conventional hard infrastructure, yet it is rarely recognized and utilized as such. A green infrastructure approach needs investment and maintenance in the same manner as other City infrastructure such as roads and sidewalks.

Tree lined streets and small parks create more pedestrian friendly neighborhoods, encouraging residents to walk more, youth to recreate locally, small children to play outside. Lack of exercise is one of the prime factors contributing to obesity and related health problems in the United States, and this is partly due to the way in which cities are built today. There is no place to walk, or destinations for pedestrian outings. Green infrastructure also increases resident's commitment to place and to participation thereby increasing safety and mental health too. Feeling like one lives in a place that is hospitable, where one can go out and get to know neighbors, creates greater social cohesion and caring.

Currently, however, there is not enough understanding of the monetary contribution that using nature's services (developing a green infrastructure) can provide. Thus more research and pilot projects such as the TreePeople Sun Valley project need to be undertaken by the region's local government. In the City of Los Angeles, for example, the Street Tree Division in the Bureau of Street Services, should be encouraged to quantify the benefits to the city in air pollution sequestration and storm water mitigation of their street trees and to ask for monetary contributions from the Department of Sanitation and the South Coast Air Quality Management District to assist in planting and maintaining a healthy, bioregionally appropriate, urban forest. The Street Tree Department's mission would then gradually change to maintaining an important aspect of the City's green infrastructure. Likewise, the Department of Transportation should begin converting less heavily used transportation routes, such as alleyways, to permeable surfaces to assist in reducing run off. These efforts could be assisted financially by the Department of Sanitation and the Department of Water and Power as they would become part of increasing water resources in the region. Permeable surfaces, wherever they can be engineered, become part of a green, parallel infrastructure that yields complex benefits. Permeable surfaces provide several: greater absorption of run off reducing storm water, pollution in the bay, the increased percolation of water back into local aquifers, and a natural cleansing process, instead of the (polluted) water being whisked to sea by an infrastructure that today, only has that one purpose and function.

Such multiple purposes of a green infrastructure approach would also apply to the conversion of residential streets into shared streets wherein a much larger portion of the street is available to pedestrians, bicyclists, and open space type uses. Encouraging intensive greening and permeability of these transportation corridors should be part of the green infrastructure mission approach of the Department of Transportation. The Department of Transportation's concern is mobility, but to date that concept has been dominated by automobile mobility. A green infrastructure approach allows pedestrian, bicycle and alternative vehicle mobility to be on a more equal footing to automobiles, and encourages a diversified approach to enhancing circulation in the City. Street trees will at the same time mitigate air pollution, reduce storm water run off, provide cooling shade to reduce the urban heat island effect, and provide habitat. These services too could become part of the Department of Transportation's responsibilities to provide. They would help mitigate some of the negative effects of traditional vehicular traffic. Finally, neighborhood-level green spaces encourage greater sociability; the Los Angeles Police Department should also contribute to the creation of this green infrastructure for improving safety in neighborhoods given its role in enhancing community safety.

There are many specific examples that could be offered for a nature's services approach to the city, and to the creation of a green infrastructure that parallels, compliments, supplements, and sometime replaces conventional infrastructure. Our research indicates such a transformation has solid economic, social, and environmental benefits and we

therefore encourage policy makers and urban managers to begin to implement this method. .
More specifically, programs should include developing criteria, policies, and programs to:

- Replace impermeable surfaces with permeable ones, including alleyways, playgrounds, parking lots and other such surfaces;
- Create and maintain urban runoff bioswales to enhance ground water recharge, reduce TMDLs and reintroduce fauna and flora in the city;
- Create and maintain an urban forest using climate appropriate trees that will mitigate the urban heat island effect; contribute to property values; reduce air pollution and mitigate storm water flows.
- Use vacant "wasted" spaces such as side lots, parking medians, spaces between buildings and roads, to enhance nature's services by an aggressive greening campaign;
- Make open spaces that are integrated into the urban fabric that build on and into mixed uses such as cafes, bookstores, skate parks and housing such that the open spaces provide connections and recreation spaces for youth, residents and visitors;
- Develop cost-sharing mechanisms among existing city departments and regional agencies to finance the reintroduction of nature's services in Los Angeles and its long term maintenance;
- Create and implement new budget accounting measures that integrate nature's services in budget lines;
- Streamline the process to convert vacant and abandoned parcels, rights-of-way and other potential small open spaces to park lands in the City;
- Create funding mechanisms for locally based neighborhood groups willing to assist, participate and undertake such greening efforts;
- Provide training and technical assistance for departments, agencies and community groups in enhancing nature's services;
- Target areas of the city that are most deprived of access to parks and open spaces to increase the equitable distribution of these amenities.
- Create new cost/benefit models for city services that account for nature's services.

It is encouraging that there is evidence that City officials and administrators are interested in this approach. Not only has the Mayor publicly stated the need for more parks in the city, but the Department of Recreation and Parks is committed not only to the mission of bringing parks and open spaces to those areas most underserved, but also to transforming parks in the city to become sites for nature's services, including the reintroduction of native species, the use of bioswales for greater storm water and runoff infiltration where ever feasible. Further, the Department of Sanitation, in its Integrated Regional Plan is moving in a holistic watershed direction to better manage the city's water from rainfall to outfall. Other cities in the country, such as Chicago are also working to implement some of these approaches, but the City of Los Angeles, drawing on local expertise, creating pilot projects, and developing new accounting approaches, could become a national leader in making cities more sustainable.

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1. Creation of a Community Land Trust

The Verde Coalition was formed as a result of research into open space policies in other cities, by members of Coalition LA, a local non-profit organization which encourages public participation in local elections. Recognizing the significant dearth of parks and open spaces in low-income communities of color, they proposed Los Angeles should create an urban land trust to provide for small neighborhood open spaces, a "Neighborhood Oasis" program modeled on the Chicago NeighborSpace Program. In 1999 a group of community advocates come together to assist in promoting this idea. They then mounted a campaign to investigate the development of an urban land trust for the City of LA. First embraced by City Councilwomen Jackie Goldberg and Rita Walters, the council adopted a motion on April 4, 2000, asking the Chief Legislative Analyst, in consultation with City Departments and community open space advocacy groups, to review Chicago's open space program and to prepare a report with recommendations for a City Council motion so as to create a similar program for Los Angeles.

The motion was referred to the Arts, Heath, and Humanities Committee (AHHC) and was tabled in July 2000. A coalition of interested groups was assembled to lobby for the urban land trust, and formalized themselves into the Verde Coalition. In August of 2001, Councilmembers Miscikowski, Ridley-Thomas and Garcetti introduced a motion declaring a lack of open space in the city and asking for research into various alternatives to acquire and develop open spaces. The motion was passed and was again referred to the Arts, Health and Humanities Committee. This time the AHHC adopted and amended the motion to instruct the Chief Legislative Analyst and various departments to report back to the committee in 60 days with findings and recommendations.

By January 2002, the Chief Legislative Analyst has not reported back to the AHHC, and the Verde Coalition lobbied for the creation of a blue ribbon task force that would include diverse perspective and community open space advocates. Such a committee was created – the Urban Land Trust Taskforce – made up of representatives from the office of the Mayor, CD 13 and CD1 as well as the City Attorney's office and Verde Coalition advocates. Together they wrote "Walking to the Park," a report outlining the need for an urban land trust, and steps that could be taken to creating one for Los Angeles.

In August 2002 the "Walking to the Park" report (included in the appendices) was completed by the blue ribbon task force and prepared by the Environmental Justice Project of the Los Angeles office of Environmental Defense. The report recommended the creation of a 501 © (3) non-profit organization headed by an independent board. The recommendations were adopted by the City Council that month.

City of Los Angeles Motion for The Urban Land Trust
> 1. NOTE and FILE the report prepared by the Urban Land Trust Task Force dated August 13, 2002 (attached to Council file) and entitled "Walking to the Park," relative to the formation of an Urban Land Trust to serve the City of Los Angeles and recommendations that the Trust be established as a 501(c)3 non-profit organization headed by an independent board.
> 2. REQUEST that the Mayor coordinate contacts and relationships among City departments to assist the Trust as necessary.

3. INSTRUCT the Department of General services to complete its work regarding listing of surplus properties, which includes identification of assessor parcel Numbers and addresses of properties throughout the city, to deliver the listing to the Planning and Land Use Management and the Information Technology and General Services Committees within 30 days, and to update and publish its listing every three months so that
the listing is continually available to the public.
4. INSTRUCT the City Administrative Officer (CAO) and the Chief Legislative Analyst (CLA) to identify funding that could be made available by the City in April 2003 to a non-profit corporation, such as the proposed Trust, and report back to the Arts, Health, and Humanities Committee within 90 days.
5. RECEIVE and FILE Motion (Miscikowski - Ridley-Thomas - Garcetti) as amended relative to developing recommendations for alternatives to acquire land for use as parks and open space, inasmuch as the Task Force has recommended that an Urban Land Trust is best formed as a non-profit corporation separate from the City of Los Angeles.

At the present time, the Verde Coalition is developing the articles of incorporation for the trust, and has selected a nominating committee for the Urban Land Trust board. The nominating committee consists of representatives from the Mayor's Office, CD 13 and CD 1, the City Attorney's office and members of the Verde Coalition.

2. Papers Submitted for Special Issue of Urban Geography

T. Young. Introduction to special issue on urban sustainability in Southern California.

T. Longcore, J. Wilson, and C. Li. Applicability of CITYgreen urban ecosystem analysis software to a densely built urban neighborhood.

S. Pincetl. People and nature in the city: environmental services and public opinion in an immigrant community of Los Angeles.

T. Young and E. Gearin. GIS and public participation planning: recommendations from Hollywood, California.

E. Gearin and C. Kahle. Youth perceptions of urban nature: a focus group study in Los Angeles.

J. Wilson, J. Wolch, and J. Fehrenbach. Parks and park funding in Los Angeles: an equity mapping analysis.