Cityscape

A Journal of Policy Development and Research

Design and Disaster: Higher Education Responds to Hurricane Katrina

Volume 10, Number 3 • 2008

U.S. Department of Housing and Urban Development
Office of Policy Development and Research

PD&R

Cityscape

A Journal of Policy Development and Research

Design and Disaster:
Higher Education Responds to Hurricane Katrina

Volume 10, Number 3 • 2008

U.S. Department of Housing and Urban Development
Office of Policy Development and Research

The goal of *Cityscape* is to bring high-quality original research on housing and community development issues to scholars, government officials, and practitioners. *Cityscape* is open to all relevant disciplines, including architecture, consumer research, demography, economics, engineering, ethnography, finance, geography, law, planning, political science, public policy, regional science, sociology, statistics, and urban studies.

Cityscape is published three times a year by the Office of Policy Development and Research (PD&R) of the U.S. Department of Housing and Urban Development (HUD). Subscriptions are available at no charge and single copies at a nominal fee. The journal is also available on line at http://www.huduser.org/periodicals/cityscape.html.

PD&R welcomes submissions to the Refereed Papers section of the journal. Our referee process is double blind and timely, and our referees are highly qualified. The managing editor will also respond to authors who submit outlines of proposed papers regarding the suitability of those proposals for inclusion in *Cityscape*. Send manuscripts or outlines to Cityscape@hud.gov.

Visit PD&R's website, www.huduser.org, to find this publication and others sponsored by PD&R. Other services of HUD USER, PD&R's research information service, include listservs, special interest and bimonthly publications (best practices and significant studies from other sources), access to public use databases, and a hotline (800–245–2691) for help with accessing the information you need.

Contents

Departments

Guest Editors' Introduction

Kathleen Dorgan
Dorgan Architecture & Planning

Michael Monti
Association of Collegiate Schools of Architecture

Kinnard D. Wright
U.S. Department of Housing and Urban Development

The symposium in this issue of *Cityscape* surveys the work of architecture, engineering, and planning schools in conducting advocacy research and service-learning projects in connection with rebuilding in the Gulf Coast region. A common thread connecting the articles is the approach that each university took to engaging the community in the processes of planning and rebuilding. As described in this volume and elsewhere, college students and their mentors were among the first to step forward to facilitate rebuilding. This commitment has been sustained despite the many challenges of working in the Gulf Coast. The resulting improvements are visible throughout the region.

The projects undertaken by university partnerships appear to us to be contributing to the education of students and faculty, building local capacity, and increasing our collective knowledge of effective strategies for community development, but much remains to be done, both in rebuilding in the Gulf Coast and in studying how to most effectively provide planning and architectural services to communities. The purpose of this symposium is to document some of the initiatives undertaken to date and to begin the process of critical inquiry that will elevate and expand such practice.

Engaged Education in Design Schools

The history of design schools studying and participating in solving the real problems of real people in working and low-income communities begins with the founding of the Pratt Institute Center for Community and Environmental Development in 1963. Davidoff's article (1965) and the challenge issued by Whitney Young at the American Institute of Architects' 100th anniversary celebrated in 1968[1] were important to shaping the community design movement that informs most community-based projects sponsored by design schools. Although we are approaching a proud half century of

[1] "You are not a profession that has distinguished itself by your social and civic contributions to the cause of civil rights," said Urban League Executive Director Whitney Young to the 100th Convention of the American Institute of Architects in 1968. "I am sure this does not come to you as any shock….You are most distinguished by your thunderous silence and your complete irrelevance….You are employers, you are key people in the planning of cities today. You share the responsibility for the mess we are in—in terms of the white noose around the central city. We didn't just suddenly get in this situation. It was carefully planned" (Young, 1968).

university-based community design led by a founding generation of practitioners, such as Chuck Turner, Chester Hartman, Ron Shiffman, Rex Curry, Rudy Bryant, Tony Costello, Henry Sanoff, and Randolph Hester, and continued by many others, most of the knowledge of the field has been transmitted orally to students, apprentices, and attendees at the annual meeting of the Association for Community Design (ACD). Writing about the field by the above practitioners and others, such as Richard Hatch, Nick Wates, Ann Forsyth, and Mary Comerio, is important but limited. Documentation and evaluation of engaged scholarship is still emerging as a recognized field of academic study.

To foster a critical dialogue in this field, the first article included in this symposium offers a framework that the reader is encouraged to apply to each engagement described in the subsequent articles, which were collected in response to a call for papers and are described later in this introduction. This first article, "Principles of Engagement: (mis)Understanding the Community-Design Studio," by Kathleen A. Dorgan, explores the advantages and challenges of undertaking engaged studios within professional design programs. An ethical framework is proposed for shaping and evaluating each engagement.

Understanding the development of university partnerships within the U.S. Department of Housing and Urban Development (HUD) leading up to the occurrence of Hurricanes Rita and Katrina provides further context for the articles in the symposium. University partnerships have been an important element in the response to the disaster caused by the storms in 2005.

HUD's Role

In 1994, HUD established the Office of University Partnerships (OUP) to encourage and expand the efforts of colleges and universities that are striving to make a difference in their communities.

The initial impetus for the office was to breathe new life into abandoned and blighted areas, including housing, commercial, and retail districts. Institutions of higher education (IHEs), or universities, are major economic forces within their regions. Typically one of an area's largest employers, universities also regularly purchase large amounts of goods and services. Faculty, staff, and students generate demand for housing near the university and represent spending power for various retail goods and services beyond what is offered on campus. The university population living near campus has a personal interest in protecting its investment and living environment. IHEs can also help communities leverage additional resources for community efforts, bringing both additional credibility and visibility to local projects.

In many instances, community residents and local not-for-profit groups that work on their behalf have had a healthy skepticism of the motives of their local IHE because of the university's acquisition of real estate and perceived wealth, power, and arrogance. Residents have long complained about the lack of dialogue and consultation with IHEs about issues of common concern.

The OUP has sought to bridge the gulf between IHEs and their communities by helping universities fulfill their urban mission in a number of ways:

- As a **catalyst,** creating a dialogue through which colleges and universities, the professional associations that represent them, and community leaders can learn from one another about promising partnership activities and opportunities.

- As a **broker,** linking universities more strongly to HUD's mainstream programs, as well as connecting them to other potential national and local partners and to resources that will enable them to revitalize distressed communities in more significant ways.
- As a **funder** of HUD grant programs that help harness the immense energy, expertise, and resources of our academic communities.

The initial program created by OUP was the Community Outreach Partnerships Centers (COPC). COPC programs combined outreach and research activities to address comprehensive, multifaceted community problems. Examples of successful COPC initiatives included, but were not limited to, the following activities:

- Job training and counseling to reduce unemployment.
- Local initiatives to combat housing discrimination and homelessness, encourage the development of affordable housing, and help consumers navigate the process of buying and maintaining that housing.
- Mentoring and educational programs for neighborhood youth.
- Financial and technical assistance for new businesses.
- Training or technical assistance that builds the capacity of community groups and increases the leadership skills of neighborhood residents.
- Planning activities that help local residents develop a vision for their community and a plan for implementing that vision.
- Projects to fight disease, crime, and environmental degradation.
- Activities that increase a community's access to information and applied research.
- University coursework that encourages students to engage in activities relating to the community.

By initiating the COPC program, HUD facilitated hundreds of partnerships that addressed the most critical social and economic issues that the United States is facing in urban areas—poverty, education, housing, and local neighborhood capacity building. The program also promoted learning and exchange, and it contributed to a growing body of literature that has accelerated the transformation of higher education and town-gown relationships. Although the program's last year of operation was 2005, clearly this modest grant program made tremendous strides in helping to change higher education from an academic culture into a force for societal change and public good. In addition to boosting the nation's interest in community engagement, COPC had a personal impact on those who were involved in it.

OUP continues to promote university-community partnerships and participatory scholarship through the Historically Black Colleges and Universities program, the Hispanic-Serving Institutions Assisting Communities program, the Alaska Native /Native Hawaiian Institutions Assisting Communities program, the Tribal Colleges and Universities Program, and the Doctoral Dissertation Research Grant program.

Although OUP is tasked with transforming entire institutions and their projects in partnership with the community, some efforts have been specifically directed toward the disciplines of architecture, urban planning, and engineering.

In 2003, OUP created the Community Futures Demonstration Grant Program (CFDGP), a 1-year effort that funded schools of architecture, planning, and construction engineering at five universities. This program enabled grantees to develop both case study housing plans and designs that addressed community housing needs and long-range plans for local communities that were addressing future growth and development needs in metropolitan areas and/or regions.

The results of CFDGP have been encouraging, with the design of structures as diverse as migrant housing in the state of Washington, affordable single-family and multifamily housing in Philadelphia, and storm-resistant structures in Louisiana (built by the Louisiana State University School of Architecture and featured in this symposium).

The devastation of Hurricanes Katrina and Rita in 2005 led HUD to create the Universities Rebuilding America Program Community Design (URAPCD). This program combined existing departmental resources to fund schools of architecture, planning, and construction engineering to develop planning, design, and/or construction projects in partnership with community organizations. Several projects described in this issue of *Cityscape* were funded by URAPCD. More information about OUP appears on www.oup.org.

Articles in This Issue

The guest editors of this symposium requested submissions from faculty and practitioners documenting work conducted by university-based architecture, landscape architecture, and planning programs to aid in the Gulf Coast region's disaster recovery process. The call specified that articles address built or substantially completed projects, such as homes, parks, and other community development projects, rather than unbuilt or classroom projects. Authors were encouraged to describe both the products and processes by which faculty, staff, students, and professional partners worked with local residents in addressing the residents' needs and concerns. The guest editors placed a premium on articles that critically evaluated the work.

The call was circulated in the fall of 2007 through *Cityscape* and OUP networks; academic channels, such as the Association of Collegiate Schools of Architecture, which represents nearly 250 professional and preprofessional architectural education programs; and architecture and planning channels such as ACD, ArchNewsNow, Planetizen, and others.

The editors received 18 manuscripts by the deadline, 16 of which were placed into a double-blind peer-review process, with authors and reviewers not knowing each other's identities. The editors removed information identifying universities and, to the extent possible, specific project sites, from the manuscripts. As guest editors, we invited a group of reviewers from the architecture and planning fields with expertise in practice and publication. Three reviewers assessed each manuscript using a standardized form that posed several questions, including whether the manuscript was appropriate based on the call for submissions, the extent to which the authors made a coherent argument, and whether it drew from existing literature.

Following the peer review, the guest editors accepted nine manuscripts as full-length articles and conditionally accepted two others as illustrative pieces because they focused primarily on built projects.

In several cases, the guest editors requested substantial revisions on manuscripts to bring them closer in line with the call for submissions and broader *Cityscape* readership. The guest editors thank the authors for their quick and responsive efforts to revise the articles for publication. They also thank the following individuals for their reviews: Jody Beck, Brandy Brooks, Connie Chung, Elizabeth Debs, Roberta Feldman, Avi Friedman, Joan Goody, Bradford Grant, Abe Kadushin, Alex Salazar, and Jess Wendover.

Participatory Planning

The following articles explore the complexities of the relationship between universities and the communities to which they provide professional planning services.

- "Citizen Engagement in Post-Hurricane Katrina Planning in Harrison County, Mississippi," by Jennifer S. Evans-Cowley and Meghan Zimmerman Gough, describes an empowerment planning process conducted by Ohio State University's City and Regional Planning program in Mississippi. It describes the methodology used to engage citizens in post disaster planning. The authors also discuss the challenges "outsiders" faced in building trust, and they address student collaboration.
- "Building Local Capacity: Planning for Local Culture and Neighborhood Recovery in New Orleans," by Jacob Wagner, Michael Frisch, and Billy Fields, describes a planning partnership between University of Missouri-Kansas City and the Urban Conservancy. The authors discuss the challenges of balancing emphasis on long- term heritage tourism planning with the community's immediate needs for business recovery support. They also address the way in which the partnership balanced university and community interests.
- "Equity Planning in Post-Hurricane Katrina New Orleans: Lessons From the Ninth Ward," by Kenneth M. Reardon, Marcel Ionescu-Heroiu, and Andrew J. Rumbach, describes the Cornell University Department of City and Regional Planning partnership with a grassroots advocacy group and other universities. The authors discuss the strategy employed to integrate this partnership with its pedagogical mission and the lessons learned from the partnership.

Affordable Housing Models

Two articles describe research applied to the design and prototyping of appropriate single-family homes intended to address the Gulf Coast region's need for producing large numbers of new, affordable homes with a limited pool of available skilled labor.

- "Rebuilding Community Block by Block," by Marsha R. Cuddeback and Frank M. Bosworth, describes a community-based methodology undertaken by the Louisiana State University School of Architecture's Outreach Office to design and develop an affordable housing model that can both be built by workers with minimal training and be responsive to local residents' preferences. A local not-for-profit developer constructed two model projects using the labor of design students working side by side with community construction trainees.

- "A Sustainable Housing Response to Hurricane Katrina," by John Quale and Kristina L. Iverson, describes a partnership between the University of Virginia School of Architecture and Habitat for Humanity to design and test a model for a green single-family home that responds to the climate of southern Mississippi. The authors describe how a house can be prefabricated at a remote location and erected on site by volunteers.

Structuring Community Practice

One of the greatest challenges of engaged research or service-learning in community development is reconciling the long-term needs of communities with the episodic character of students' participation. The final set of articles describes alternative structures for addressing this challenge and projects facilitated by such structures.

- "Working With Experience," by David Perkes and Christine Gaspar, profiles the partnership between Mississippi State University's Gulf Coast Community Design Studio and the East Biloxi Coordination and Relief Center to establish an office that provides services that range from municipal planning to the design of individual homes, using a combination of full-time staff and curricular studios.
- "Biloxi Treehouse Project," by Vincent Baudoin, describes a single-family home designed and constructed by the Mississippi State collaborators.
- "URBANbuild: Architectural Networks of Real Urbanism," by Ila Berman, describes an initiative by the Tulane School of Architecture to launch an interdisciplinary center to support research and innovative design with the goal of implementing real urbanism in the reconstruction of New Orleans.
- "Rebuilding for the Seventh Ward's Cultural Life," by Rob Corser and Nils Gore, describes a series of design-build projects undertaken by the University of Kansas School of Architecture and Urban Design in collaboration with CITYbuild.
- "Rebuilding New Orleans With Affordable, Hurricane-Resistant Residential Construction," by James Goedert, reviews efforts by the University of Nebraska–Lincoln and Catholic Charities of the Archdiocese of New Orleans to rehabilitate 10 heavily damaged homes and to provide a publicly available manual and extensive documentation that will facilitate reconstruction efforts elsewhere in the city.

Conclusion

The study of building, planning, and design undertaken in the public interest must be increased if we are to develop the skills and strategies necessary to most effectively invest public and private dollars in rebuilding. Those individuals involved in the design, planning, and building of communities lack knowledge of the most cost-effective ways to plan in order to create sustainable, long-term value for residents and neighbors. The relevant disciplines must engage in far more fundamental and applied research. As described in this symposium, university partnerships in community design hold great promise for bridging this gap and helping the fields of architecture

and planning move toward evidence-based practice. The permanent establishment of programs such as COPC and Community Futures could be a first step toward this goal.

The guest editors and the authors hope that our nation never again has to face the type of destruction that Mississippi and Louisiana faced because of Hurricanes Katrina and Rita, but history tells us that we must be prepared to address such disasters. When the next generation of leaders in government, community, and professional practice face a call for a large-scale planning and building response, some of them will have prepared for their roles through active engagement as students in the Gulf Coast. By studying under the tutorship of faculty and community leaders, they will be better prepared to manage the complexities of community development to accomplish something extraordinary.

References

Davidoff, Paul. 1965. "Advocacy and Pluralism in Planning," *Journal of the American Institute of Planners* 31(6): 331–338.

Young, Whitney, Jr. 1968. "Keynote Address by the Executive Director of the National Urban League." http://www.archvoices.org/ (accessed July 11, 2003).

Principles of Engagement: (mis)Understanding the Community-Design Studio

Kathleen A. Dorgan
Dorgan Architecture & Planning and Roger Williams University

Abstract

This article provides an overview of the benefits and challenges to universities and communities of design schools undertaking university-based community-design projects and suggests an ethical and practical framework for the planning, management, and evaluation of these studios.

Introduction

As the practice of bringing real-world problems into the academic design studio—and simultaneously bringing students into the community—grows in popularity, it is appropriate to pause to explore the conflicts of interest that result from the various participants' different motivations and to suggest practices that balance the needs of the community with the needs of the academy. Reflecting on their research and community engagement as faculty members at the University of Massachusetts, Department of Landscape Architecture and Regional Planning, planner Ann Forsyth and her collaborators Henry Lu and Patricia McGirr (Forsyth, Lu, and McGirr, 2000) extol the value of community- design studios, but they also warn that "the pre-professional nature of student work may burden low-income neighborhoods with low-quality design and planning products."[1] This article explores the measures necessary to maintain excellence in both the process and the product of community-design studios and the institutional structures or community-design centers that support this engagement. It is written from the viewpoint of an advocate for these engaged studios.

[1] Forsyth, Lu, and McGirr (2000: 237).

The Changing Landscape of University-Based Community Research and Action

Many design education programs include community-design centers that have a service-learning component. Students and faculty of architecture, planning, and design schools have a long tradition of working in partnership with disadvantaged communities. Until recently, only faculty members whose practice was centrally concerned with community-design issues undertook such projects. Some community-design programs have received generous support from departments and universities, but more often, as Cardiff University participatory designer Bob Fowles explains, "an enthusiastic individual tutor in a generally unsupportive environment" performs the work.[2] Community-design advocates have often bucked institutional impediments to undertake activities they believe will result in greater community justice.

For example, University of Connecticut School of Landscape Architecture students worked with the Neighborhoods of Hartford, Inc., professor Kristin Schwab, and the author, to explore community design alternatives with neighborhood residents. The community development corporation provides the continuity and access to resources that are difficult to obtain within the structure of curricular design studios and in turn the university-based community-design studio is able to generate a variety of design options that are seldom available to underresourced communities. (See photos in the online appendix at www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html.)

In cutting-edge design schools, however, community designers are no longer outsiders. As part of a larger movement to engage young people in service, universities are renewing their commitment to prepare students for their role as citizens. These institutions are also recognizing the inextricable links between their fate and that of their neighbors. Responding to the interest in community renewal, Yale, Penn State, and Howard Universities have augmented support for their university-based design centers. Increasing participation in community-design studios appears to benefit both scholars and community members, yet the expansion of community design is cause for concern. Are universities sending faculty and students into the field who are not equipped to do this type of work? Are universities being honest about their purpose in establishing these centers?

> Evaluating the pitfalls and best practices of university-community partnerships, high standards must be set and understood as a basis for all involved.

Challenges to the Community-Design Studio

Researchers such as Henry Sanoff and Janet Eyler (Sanoff and Toker, 2004; Eyler, 2000) have documented university-community collaborations that have supported communities, students, faculty, and institutions. They have found that, among other benefits, service learning can lead students to develop lifelong habits of taking action in the public interest, and it can build the skills necessary to deal with the complexities of real-life problems. As thoughtful teachers and practitioners, however, we need to reflect on the challenges as well as the successes. A danger exists that

[2] Fowles (1992), as quoted in Towers (1995: 196).

well-intentioned projects may result in harm rather than benefit. For instance, service learning may perpetuate patterns of perceiving communities in terms of their deficiencies instead of their assets. Poorly executed projects—or even well-executed projects with poorly executed followup—may sour the community, the university, and students concerning the potential for change. Rather than ease town-gown (that is, community-university) tensions, such projects may intensify cross-cultural and institutional conflicts.

Sociologists Jane Allyn Piliavin, Jean A. Grube, and Peter L. Collero counsel that public service efforts "rarely contribute to the eradication of social problems and may under certain conditions actually serve to preserve and solidify social inequity" (Piliavin, Grube, and Callero, 2002: 469). Psychologist Carol M. Werner and her collaborators observe, "When student service scholars take away control from citizens, they can undermine citizens' perceptions of competency; when faculty reduce students' choice and responsibility, they can undermine students' efficacy and desire to learn" (Werner, Voca, Openshaw, and Simons, 2002: 557). Even the publicity attendant upon excellent work can disguise the need for additional interventions after the cameras are switched off.

Roles in Community Research and Action

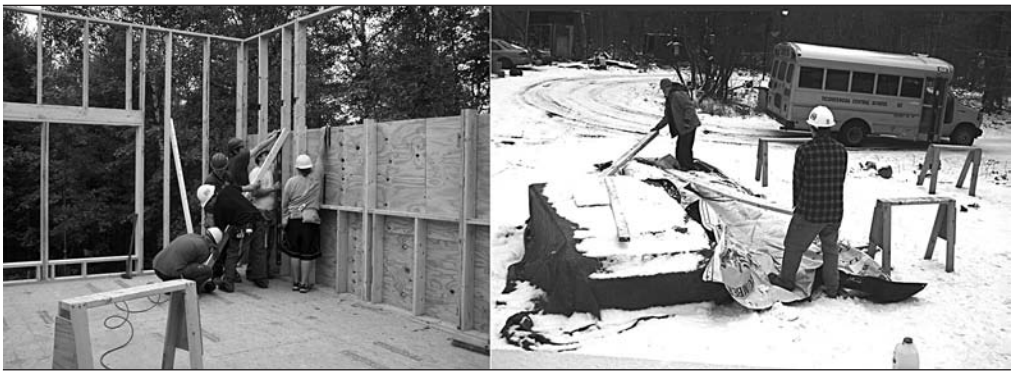
Each service-learning project typically has at least five groups of participants with distinct interests: university administration, community members, staff, faculty, and students. Psychologists Arthur A. Stukas and Michelle R. Dunlap suggest that "it is important to recognize not only the ultimate goal of betterment of the community, but also how each constituent group is represented and treated in the process of attaining a mutually agreed-upon better community" (Stukas and Dunlap, 2002: 411). Service-learning projects strive for synergy among the interests of each party. Because conflicts of interest are inevitable, however, responsible practice requires deliberately structuring projects in a way that avoids irresolvable conflicts. Collaborators at Indiana University Robert G. Bringle, a professor of psychology, and Julie A. Hatcher, a professor of education, explain that university-community relations require the same type of attention as interpersonal relationships. The best relationships are reciprocal (Bringle and Hatcher, 2002).

Each design and research project carries the responsibility to educate students, provide a tangible community benefit, consider community contexts, and respond to stakeholders' needs and interests through a participatory process (Quinn, Gamble, and Denham, 2001). The best projects also build local capacity, are contextual, and endure (Quinn, Gamble, and Denham, 2001). (See exhibit 1.) As noted by the architect and planner Graham Towers, design quality should precede design innovation (Towers, 1995). Among the practitioner's greatest challenges is delivering service learning in a sustainable way. Without this component, the danger exists that service learning will undermine rather than enhance community efforts to shape the environment.

Community-design studios must be built on a foundation of engagement with the community members who are the "clients" for the studio's services. American Studies scholar W. Arthur Mehr-hoff explains, "Community design is ultimately about empowering the citizens of local communities to shape their . . . own preferred futures by acquiring and applying information and knowledge about their communities in a far more systematic, thoughtful, and democratic manner than current practice" (Mehrhoff 1999: 122). Mary Comerio, a professor of architecture at the

Exhibit 1

Champlain Valley, New York, Technical Education Center: State-of-the-Art Green Building Techniques



Technical Education Center (TEC) students learn state-of-the-art green building techniques from teacher Kevin Shaw. The students build community capacity as they construct EQUITY HOME, whose design was informed by a collaborative research and participatory process funded by the New York State Council on the Arts. This initiative by the Housing Assistance Program of Essex County to replace low-quality depreciating assets that are a detriment with homes that conserve resources and create long-term value for residents and the community grew out of the research and design-build experience of the HUD-funded Community Outreach Partnership Center at Rensselaer, in which the author participated. Photo credit: Kevin Shaw, Champlain Valley TEC, Mineville Campus.

University of California, Berkeley (UC Berkeley), notes, "Physical decisions are political decisions about who gets what, when, where, why, and how." She expands her discussion about the political aspect: "Community design is guided by two principles of empowerment, one political, the other enabling. The first recognizes the rights of all citizens to have a voice in future decisions that affect the places they inhabit, work and linger in. Further, it recognizes the professional's responsibility not to be neutral in the face of exploitation of people or the destruction of the environment" (Comerio, 1984: 227).

In many cases, communities require design services before they can explore the range of options. Meeting this need is one way in which curricular design programs are often effective.

For example, the State University of New York College of Environmental Science and Forestry Center for Community Design Research, directed by Cheryl Doble, offered a curricular design studio that explored options for redeveloping a vacant lot, which resulted from the demolition of a vacant property that harbored drug sales and prostitution, in a distressed Syracuse neighborhood that provides a home for many new immigrants, including refugees from Vietnam. Within the community, the Franciscan Collaborative Ministries and community translators supported the connection to the community and helped maintain ongoing dialogue with neighbors. The students generated a variety of options. This plethora of ideas was important for expanding the community's perception of its options for redeveloping the vacant lot and remedying the former nuisance. Faculty introduced students to techniques of community engagement and the process of working in a participatory manner with a client to achieve a richer, more effective solution to the design problem than would be possible in isolation. (See exhibit 2.) A new pocket park constructed of sinuous landforms will accommodate daily use as well as festival events. The park, Freedom

Garden, also includes sculptures that provide narratives about the struggles of many residents on their journeys to freedom in the community. Recognizing the importance of bringing the project to completion, the studio director enlisted the assistance of the local chapter of the American Society of Landscape Architects in identifying a local firm to partner with the studio and continue the project through to completion on a pro-bono basis. Apple Osborne Landscape Architecture stepped forward to assume this role. A member of Osborne's staff, Peter Ayer, followed the project from the initial student presentation and is in the process of completing the construction drawings. His participation helped both the students and the community focus on issues of constructability and budget. He will administer the project's construction, which is being funded by the Syracuse Neighborhood Initiative, which receives its funding in turn from the U.S. Department of Housing and Urban Development.

Exhibit 2

Using Models To Communicate With Neighborhood Residents

The use of models provides an important tool for communicating with neighborhood residents. Older residents may not be familiar with drawing conventions or design vocabulary. In the design process for the Freedom Garden in Syracuse, New York, younger community residents served as translators and participants as they examine the model with older residents. Photo credit: Cheryl Doble.

Fortunately, the movement provides a rich source of information for those who are establishing community-design studios. Leaders of such programs should familiarize themselves with the work of other practitioners and join the dialogue on community practice. Each studio should have clear principles of engagement. The Association for Community Design offers the following foundational tenets for community-design practice:

1. **Equity and justice.** Advocating for those who have a limited voice in public life.
2. **Diversity.** Promoting social equality through a discourse that reflects a range of values and social identities.
3. **Participatory decisionmaking.** Building structures for inclusion that engage stakeholders and allow communities to make decisions.
4. **Quality of life.** Advancing the right of every person to live in a socially, economically, and environmentally healthy community.
5. **Integrative approach.** Creating strategies that reach beyond the design of the built environment.
6. **Place-based solutions.** Generating ideas that grow from place and build local capacity.
7. **Design excellence.** Promoting the highest standards of quality in the design and construction of the built environment.

It is not enough, however, merely to affirm these principles or to intend to follow them. To be responsible, university-based community-design practitioners must develop structures that facilitate the provision of both excellent design services and an excellent education Without such structures, projects will fail due to an inability to sufficiently engage with the community. In *Planning Neighborhood Space with People*, community designer and UC Berkeley landscape architecture professor Randolph Hester considered the reasons that the Fletcher School playground he designed was vandalized and nearly abandoned. He confesses a lack of attention to the residents' values: "These goals require a long-term commitment to grass-roots community development, not just a flashy, expensive design for one playground. . . . I had said, in effect, that the product was more important than the process, yet the process of grass-roots community development was far more important to the residents than any single product" (Hester, 1984: x).

The Rules of Engagement

Fully engaged community-design studios hold great promise for improving communities and educating future design practitioners. The best structures for engagement include the following elements:[3]

1. **Transparency.** Every participant should have a picture of the entire project. Everyone should understand the type of work to be done and the skill levels of all the individuals doing the work. Quinn, Gamble, and Denham (2001) remind us that "when a student is providing a service to a…client or community, it is the student and preceptor's responsibility to inform the client of the skill level of the student, his or her capacity to provide that service, and any risks involved. The recipient of the service must have the opportunity to accept or deny student involvement" (Quinn, Gamble, and Denham, 2001: 19–20). Roles and responsibilities

[3] Ronald F. Ferguson and the author previously identified these principles in an analysis of communitywide youth development initiatives (Dorgan and Ferguson, 2003).

might be formalized in a contract that covers several bases. First, faculty and students should understand how their work will be used and how it contributes to the overall effort. In turn, community members should be told what the studio's goal is and how their contribution of time and expertise will affect the final project. Players in each role should know what resources are available for the project and the path necessary for bringing the project to fruition.

It is especially important for community clients to understand the level of the university's commitment to the project. Community members may assume a level of commitment or expertise based on the regard with which the community holds the university. This example of successful "branding" may provide access to opportunities that otherwise would not be available to faculty and students, but it also may raise false expectations on the part of community members. Rarely are the skills of an entire institution brought to bear on a single service-learning project.

Communities also deserve to know if community service is truly voluntary. Unfortunately, it is increasingly common for schools to require students and faculty to perform community service. Such compulsory service not only contradicts the tenets of volunteerism, it also may seem disingenuous and, in some cases, it may decrease students' interest in volunteering in the future. Along the same lines, George Mason University public policy professor James P. Pfiffner notes that a public service ethic "implies more than just ethical behavior on the job; it also entails a dedication to the public interest and a commitment to mission accomplishment" (Pfiffner, 1999: 1). Therefore, participation in all community-design studios should be optional, and only students and faculty who can provide professional services that meet the needs of the community should be invited to participate.

2. **Capacity.** Participants must have the capacity to fulfill their roles in the project. This requires intellectual, social, and, often, financial capital. Community-design initiatives require architects to expand their areas of knowledge, as described by Towers, to include urban history, the social organization of communities, government, and politics (Towers, 1995). Students may need training in research techniques, workplace skills, and the cultural norms of the community where they are to work. Community members, for their part, may require briefings to effectively fulfill their roles as decisionmakers.

   Understandably, faculty members who lead design studios are often selected for their cutting-edge experimental work, strong philosophical convictions, and ability to give useful criticism. They may be less skilled in listening, working within political constructs, and implementing projects. The academy often does not address potential deficiencies in other practical skills, such as estimating costs, navigating building codes, and obtaining funding. Universities should address these areas, however, if they want their design studios to be successful for all involved. Mehrhoff explains: "Academicians need to acknowledge the limits as well as the strengths of their academic disciplines in order to serve their communities more effectively" (Mehrhoff, 1999: xvi). To fill such gaps, the University of Hartford invites practicing professional engineers with appropriate expertise to serve as mentors, working alongside students and faculty in each of the school's community-based senior projects.

   Before accepting a commission to work on a community-design project, studio directors need to determine whether adequate resources are available to undertake and complete the project

successfully. Universities can augment a studio's capacities by providing training, employing community liaisons, and funding project expenses. Programs with limited resources can successfully engage in community work by partnering, undertaking projects of a limited scope, or obtaining additional resources.

Towers describes an instance in which the Architectural Association in London worked with the tenants of the Castlemilk housing project to develop options for renovation of the project (Towers, 1995). The team's lack of skill in cost estimation resulted in the presentation of development scenarios that bore no relationship to real-world options or budgets. This left the tenants unable to progress toward their goal of community improvement, despite their investment of considerable time and resources in working with the studio.

In a successful example of collaboration, Brad Guy, with the Hamer Center for Community Design at The Pennsylvania State University, worked with a Hancock County commissioner, The Green Project, and the Building Goodness Foundation to construct two model projects that used recovered materials to create additional space for families living in crowded Federal Emergency Management Agency (FEMA) trailers in Pearlington, Mississippi. Although the Building Goodness Foundation provided a long-term commitment to the community, local knowledge, and an established record of working with the families affected by Hurricane Katrina, the engaged learning team brought ideas and expertise in reusing salvaged material. The resulting stand-alone room of post and beam framing and applied panels was conceptualized to be more flexible than the typical accessory building. The footings used employ augers as hold-downs to allow the structure to be easily moved or dismantled. The only new materials used in the project were a white painted metal roof surface that reflects the sun and a radiant barrier material behind the rain-screen siding on the west side. The roof is sloped up to the north to allow for daylight exposure at the upper "clerestory." (See exhibit 3.)

The design-build team also incorporated a workbench, fish cleaning area, observation porch, and bench in the final project (see photo in the online appendix at www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html).

3. **Flexibility.** Community-design studios require resilient structures that have the flexibility necessary to respond to the conditions of real-world practice. Quinn, Gamble, and Denham (2001) report that one of the authors and her student team encountered resistance when beginning a community-needs assessment in a much-studied neighborhood. The team was able to successfully complete its work, however, by changing its plans and agreeing to teach area young people how to use computer software and a number of other skills that enabled them to produce their own exhibit about the community.

   One of the greatest challenges to flexibility in service learning is the university's academic schedule. Providing solutions to complex community issues usually requires engagement for an extended time. To address schedule-related constraints, Scott Wing, a professor of architecture at Penn State, offers a spring semester research course that prepares students for a summer community-design-build studio; this course, in turn, is followed by a fall class in which students reflect on their experience to address the element described next in this article.

Exhibit 3

View of the West Side of a Shed Built in Pearlington, Mississippi, June 2007

The siding, as seen on the west side of a shed built in June 2007 for Billy Ray Raines, is "barge-board" salvaged from New Orleans houses. The 2- by 6-inch posts and beams are from a deconstructed Ocean Springs, Mississippi, home. Photo credit: Brad Guy.

4. **Accountability.** Community-design studios must incorporate systems to ensure that the work product, the community relationship, and other aspects of performance meet professional-quality standards and educational requirements.

   Projects in communities where the university has a vested interest pose special challenges because there may be legitimate suspicion of the designers' motives in undertaking a project and conflicts between the neighbors' goals and the goals of the university that employs the faculty. The institution's interest, however, may allow the studio access to more resources than it otherwise would enjoy. Resolution of this any conflict between the university's institutional interests and community interests usually requires university involvement beyond that of an individual faculty member.

Due to the complex nature of community-design issues, reflective practice—the process by which professionals learn from their work, as first described by the influential thinker and Massachusetts Institute of Technology professor Donald A. Schon (1995)—and peer review are among the most promising strategies for evaluating and continually improving the design studio's work. In the limited studies undertaken to date, reflective practice appears to benefit both students and the

community. Evaluation should occur before project implementation, during the course of the work, and after completion of the project. Whenever possible, postoccupancy studies should also be conducted. Evaluation participants should be selected from as broad a base as possible and should include at least students, faculty, and community members.

Community-design projects can benefit both students and communities. In order to do so, it is not enough simply to schedule projects that examine important social issues. Community clients have the right to expect the highest quality professional services, and students should be exposed to the best practices. Therefore, as advocates for community-design studios, we have a responsibility to take precautions to ensure excellence in our work. We need to acknowledge that community-design services that fail to meet the needs of the community can do more harm than good and may undermine the delivery of other professional services to that community. Those who plan engaged community-design studios must be careful in project selection and should ensure that adequate resources are available to meet their obligations. Sponsors can design programs that are more likely to produce a successful project by adhering to the principles of engagement, which means the programs should be transparent, capable, flexible, and accountable.

As Mehrhoff observed: "Universities offer excellent venues for studying the messy order of communities…. My personal odyssey into community design has led me to profess the firm belief that our future well-being as a civilization requires fundamentally rethinking the shape and shaping of our communities" (Mehrhoff, 1999: xvi). The engaged community-design studio is a success when the community receives value in excess of the project's cost and members of the university prepare for a lifetime of contributing to their communities and improving conditions throughout the world.

Acknowledgments

The author thanks Ron Ferguson for his insights into the structure of community initiatives, Connie Chung and Frances Bronet for their insights into community-design practice, Jerome Chou for research assistance, the Loeb Fellowship at the Graduate School of Design for the freedom to explore her interest in community-design, and Eric Kurz and Alex Dorgan for encouraging her to present at InsideOut: The 2nd Biennial International Conference on Higher Education & Community Engagement at the University of Queensland in Ipswich, Australia, where the ideas in this article were first discussed with her peers.

Author

Kathleen A. Dorgan is principal of Dorgan Architecture & Planning and an adjunct faculty member at Roger Williams University.

References

Bringle, Robert G., and Julie A. Hatcher. 2002. "Campus-Community Partnerships: The Terms of Engagement," *Journal of Social Issues* 58 (Fall): 503–16.

Comerio, Mary C. 1984. "Community Design: Idealism and Entrepreneurship," *Journal of Architectural and Planning Research* l: 227–243.

Dorgan, Kathleen, and Ronald Ferguson. 2003. "Success Factors in Community-Wide Initiatives for Youth Development." In *The Youth Development Handbook: Coming of Age in American Communities,* edited by Stephen F. Hamilton and Mary A. Hamilton. Thousand Oaks, CA: Sage Publications.

Eyler, Janet. 2000. "Studying the Impact of Service-Learning on Students," *Michigan Journal of Community Service Learning* (Special Issue): 11–18.

Forsyth, Ann, Henry Lu, and Patricia McGirr. 2000. "Service Learning in an Urban Context: Implications for Planning and Design Education," *Journal of Architectural and Planning Research* 17 (August): 236–259.

Fowles, Bob. 1992. "Where Are the People?" *Building Design* April 10.

Hester, Randolph T., Jr. 1984. *Planning Neighborhood Space with People*, 2nd ed. New York: John Wiley & Sons.

Mehrhoff, W. Arthur. 1999. *Community Design: A Team Approach to Dynamic Community Systems.* Cities and Planning Series, edited by Robert J. Waste, Margaret F. Wilder, and Roger W. Caver. Thousand Oaks, CA: Sage Publications.

Pfiffner, James P. 1999. "The Public Service Ethic in the New Public Personnel Systems," *Public Personnel Management* 28 (4): 541–555.

Piliavin, Jane Allyn, Jean A. Grube, and Peter L. Callero. 2002. "Role as Resource for Action in Public Service," *Journal of Social Issues* 58 (Fall): 469–485.

Quinn, Sandra Crouse, Dorothy Gamble, and Amy Denham. 2001. "Ethics and Community-Based Education: Balancing Respect for the Community With Professional Preparation," *Family and Community Health* 23 (January): 9–23.

Sanoff, Henry, and Zeynep Toker. 2004. *Three Decades of Design and Community: History of the Community Development Group*. Raleigh, NC: North Carolina State University, School of Architecture.

Schon, Donald A. 1983. *The Reflective Practitioner: How Professionals Think in Action.* New York: Basic Books.

Stukas, Arthur A., and Michelle R. Dunlap. 2002. "Community Involvement: Theoretical Approaches and Educational Initiatives," *Journal of Social Issues* 58 (Fall): 411–427.

Towers, Graham. 1995. "The Ivory Tower: Educating Building Designers." In *Building Democracy: Community Architecture in the Inner Cities.* London: University College of London Press: 182–197.

Werner, Carol M., Rose Voca, Kellie Gaufin Openshaw, and Michael Simons. 2002. "Designing Service-Learning To Empower Students and Community: Jackson Elementary Builds a Nature Study Center," *Journal of Social Issues* 58 (Fall): 557–579.

Citizen Engagement in Post-Hurricane Katrina Planning in Harrison County, Mississippi

Jennifer S. Evans-Cowley
The Ohio State University

Meghan Zimmerman Gough
Virginia Commonwealth University

Abstract

This article describes an empowerment planning process that brought residents, public officials, and university students together in Harrison County, Mississippi, following the devastation that Hurricane Katrina brought to this community in August 2005. The participants in this process worked to develop solutions to several critical problems involved in rebuilding efforts. The article addresses methods of engaging community members in a participatory planning process, structures for supporting student learning for future efforts, and the challenges of overcoming local residents' perceptions of outsiders' participation in their process. The article concludes by proposing measures for evaluating the merit of a planning process.

Introduction

Hurricane Katrina devastated the Mississippi Gulf Coast in August 2005. Such devastation is evident from communities such as Pascagoula in Jackson County, which had 90 percent of its housing stock damaged (Thompson, 2005) and Henderson Point in Harrison County, which had 99 percent of its housing destroyed. The three coastal counties of Hancock, Harrison, and Jackson all were significantly impacted by the hurricane. The largest of these counties, Harrison, has a population of approximately 190,000 and is the tourism center of the coast, with numerous casinos, a man-made beach, and other forms of entertainment.

In response to the hurricane disaster, the Congress for the New Urbanism and the Mississippi Governor's Commission on Recovery, Rebuilding, and Renewal hosted a weeklong charrette—the Mississippi Renewal Forum—to help plan for the rebuilding of the Mississippi coast. Before Hurricane Katrina destroyed coastal communities in Mississippi, planning had been limited in these communities, with only the largest cities having professional planning staff. Planning and zoning generally had a negative connotation and, in the more rural areas, was believed to be associated with communism (Bonck, 2005).

The Mississippi Renewal Forum was focused on developing a common planning vision for the future of the coast. The Congress for the New Urbanism provided planning teams for each of the incorporated cities, but it did not provide planning teams to work with the counties, which are responsible for planning in the unincorporated areas. The planners for the counties were invited to attend the forum and participate in it, but the forum provided no planning for the county jurisdictions.

This article describes the experiences of Ohio State University's Knowlton School of Architecture in facilitating a citizen-engagement process for communitywide planning on the Mississippi Gulf Coast. The article identifies the obstacles to planning and the measures taken to address them. The authors demonstrate the need to first establish trust with the community as an essential element in creating a credible planning process. The process shows that a limited planning history in the Mississippi Gulf Coast created a need for Ohio State's supportive program to serve a dual role—as planners and as educators about planning and its democratic functional process.

Initial Strategies

The university participants found personal connections to be of critical importance to planning on the Gulf Coast. Because it is difficult for "outsiders" to come into a community and be successful, team-building often begins through personal introductions by a third party known to both teams. For example, the partnership between Ohio State University and Harrison County was initiated by and built on a personal connection established with colleagues just before the storm. Following the hurricane's landfall, Evans-Cowley contacted her colleagues on the coast to find out if they needed help. Because of the Gulf Coast's widespread needs, her colleagues suggested contacting Harrison County's zoning administrator, Patrick Bonck. Bonck expressed an urgent need on behalf of the coastal communities for professional assistance in redevelopment. Ohio State University initiated a grant of $17,000 and, in October 2005, Bonck and Evans-Cowley developed the project goals and immediate scope of work.

A primary goal for the planning process was to create a citizen-engagement process that increased community capacity to implement the plans. Before Hurricane Katrina, citizens in Harrison County had limited experience with land-use planning functions. Another primary goal of the planning process was to create plans that would help promote safer communities in the rebuilding process. Those goals would be achieved through a citizen-based planning process integrated with planning tools, such as land suitability analyses, to identify the suitability of land for development based on factors such as soil type, access to infrastructure, and location in a flood plain.

The initial scope of work involved working with citizens in two communities to find out what they wanted and to address code-related issues. Bonck selected the community of DeLisle because

of its racial and economic diversity and because of the heavy damage that the storm wreaked on that town. He also chose the community of Saucier because it was likely to experience the effects of citizens moving northward to safer parts of the county. This work was then extended in March 2006 (until March 2008) through a major grant as part of the HUD Universities Rebuilding America Partnerships (URAP) program.

Over a 2-year period, the project, through a series of studio courses, has developed community plans for six communities: DeLisle, Eastern Harrison County, Henderson Point, Pineville, Saucier, and Western Harrison County. For two quarters, the planning studios involved 12 students working in teams of between four and six students, each assigned to a community. The students worked with two or three communities over a 7-month period starting in the summer and extending through January. They worked on an independent-study basis over the summer, starting their studio with fieldwork in Mississippi in advance of the fall quarter. They committed to returning to Mississippi the following quarter and agreed to stay on the project on an independent-study basis until it is completed in the winter quarter. The project is ongoing as university teams continue to work with Harrison County to complete zoning and subdivision regulation updates.

Creating Plans That Matter

The plans created in the planning process needed to be the result of a community-driven process with considerable stakeholder input. Credible plans would (1) represent the concerns of the community and (2) be readily adopted and implemented.

A *community-driven process* is defined as one that gives individual citizens the power to influence policy (Julian et al., 1997). In this case, although the county initiated the planning process, the citizens drove the agenda, development alternatives, and plan recommendations. Planners can stimulate more citizen involvement by providing opportunities for dialogue that include informing the community about planning issues, listening to citizens' concerns, and synthesizing these concerns into the community plans.

Establishing trust is especially important in Mississippi, where citizens frequently perceive planning as being a communist concept and where researchers sensed a distrust for "northerner" consultants among the citizens. In addition to creating an appropriate plan, engaging stakeholders in a planning process can result in enhanced social capital (Burby, 2003; Gruber, 1994; Innes, 1996). A citizen-participation process allows for planners to educate citizens on planning issues and concerns, whereby increased knowledge leads to greater understanding about what may be possible (Innes and Booher, 1999).

To effectively gain the interest of citizens, planners must provide citizens with significant roles in the planning process and provide them with power in decisionmaking (Arnstein, 1969; Forester, 1999; Innes, 1996; Wondolleck and Yaffee, 2000). Citizens need to be engaged in deciding the goals of the plan and in creating the plan alternatives (Godschalk, Brody, and Burby, 2003).

Having extensive citizen participation can result in greater knowledge and innovative ideas that can improve plan quality (Forester, 1999; Moore, 1995). Innes et al. (1994) and Innes (1996) also found that citizen involvement in planning processes resulted in increased political capital

that helped in implementing planning actions. The citizen-based process was important in the Mississippi context because it generated political capital that translated into interest and ownership in the plan, motivating citizens to push their local leaders to adopt the planning documents. Researchers have found that effectively creating a sense of ownership in the plan can reduce potential conflict in the long term, because citizens feel responsible for the plan's policies (Creighton, 1992; Wondolleck and Yaffee, 2000).

Although citizen participation increases the cost and time needed to produce a plan, this upfront investment can pay off with buy-in for the long-term solutions. The end result includes equitable solutions that protect the interests of the citizens (Godschalk et al., 1994). In Mississippi, the preferred outcome of the planning process would be a shared sense of ownership of the plan and its implementation.

Engagement Process

At the time, the HUD Secretary wanted the URAP program to empower students and faculty to get involved in this important rebuilding effort (HUD, 2006). The planning process in Harrison County was not only designed to empower students, but also to empower communities. The planning process engaged local voices to ensure that the community plans represent the interests of the communities by using an approach based on community empowerment (Evans-Cowley and Gough, 2007b; Reardon, 2000). The planning teams started by collecting basic information about the communities before the storm occurred and by conducting phone and personal interviews to begin to understand citizens' visions for the future of the communities.

Evans-Cowley thought it critical to integrate direct-action organizing techniques—described below—to ensure as much citizen participation as possible in the community-planning process (Alinsky, 1971). The intent was both to ensure that the plan represented the intentions of the people and to help build support for the plan and its implementation.

Citizen Outreach Approaches

The team designed a multipronged outreach approach to try to maximize the likelihood of reaching citizens in this hurricane-ravaged county. To identify who the citizens of each community were and how to reach them most effectively post-Hurricane Katrina, the team started by engaging the County Board of Supervisors. These elected county officials appointed citizen steering committees that ranged in size from five to nine members and represented the different areas and interests within each community. The steering committees were charged with talking to neighbors, promoting the town hall meetings, sharing their and their neighbors' thoughts on what the future of their communities should be, and reviewing drafts of the plans.

The team planned an initial town hall meeting for each community. The students prepared a separate newsletter and mailed it to every property owner in each planning area. They sent out the newsletter before the planning process began in each community, again following the first community meeting, and then throughout the remainder of the planning process. They sent postcards to notify property owners when town hall meetings were being held and sent flyers with the same information home with elementary school students. Before the town hall meetings, students went

door to door to announce meetings and posted flyers in local businesses. For rental communities and Federal Emergency Management Agency (FEMA) trailer parks, the students posted flyers and knocked on doors. All these outreach methods resulted in highly attended town hall meetings. For example, in Henderson Point, where only 24 houses were left standing and fewer than 20 people still lived in the community, more than 400 people attended the first town hall meeting. In the Lizana community, approximately 500 citizens from the town and surrounding communities attended the first town hall meeting, gathering in a non-air conditioned school gym for 2 hours to share their thoughts on the future of their community. (To see a photo of the Lizana citizens crowded into the school gym, visit the online photo appendix at www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html.)

The team established an 800 number to enable citizens to call in and leave messages with their questions and comments about the planning process. Property owners living outside Harrison County primarily used this resource; they called to find out whether their properties had been impacted by the storm, to find out what the county was doing, and to request copies of planning materials. This tool proved to be an effective method for engaging citizens living outside the county, which was essential in a disaster situation in which much of the community had relocated.

The team established an online discussion board to enable those with Internet access to keep up with what was going on and to ask questions. The extent of the use of this resource varied from community to community. As the planning processes continued, the discussion forum transformed from its primary purpose as a discussion forum for long-range planning processes into a multipurpose, community-rebuilding resource board.

The town hall meetings were structured to solicit as much information as possible from citizens about what they wanted for the future. When citizens arrived at the meeting, a team member met them at the registration desk, which allowed the citizens to interact with a friendly person from the moment they arrived. Children who attended the meetings received their own newsletters, which included a word find puzzle, a maze, and simple articles on what community planning is and how to become a planner. After registration, a team member directed the citizens to a map where another team member showed them the location of their respective property. Judging by the number of identifying dots that team members placed on the map for each property represented, the team could assess whether the meeting achieved representation from throughout the county. This map activity also offered citizens an opportunity to meet with a planning team member. Another map showed all the development proposals that the county had approved in the citizen's community along with the development-proposal site plan. This additional map provided important and timely information that allowed residents to stay informed about future development.

First Town Hall Meeting

The town hall meeting structure was specifically designed to gain input from everyone, ensuring that the voices of only a few citizens did not dominate. These meetings were designed so that two town hall meetings were held per community; one meeting was held at the beginning of the planning process and one was held near the end of the planning process. For example, the dates of the town hall meetings were scheduled in January and March 2006, September and December 2006, September and December 2007, and March and June 2008. As detailed in the following text, the

first and second town hall meetings were designed to gather different types of feedback from the communities.

During the first town hall meeting, citizens first met in small groups to discuss what they liked best about their community before the storm, what they liked least, and what they would do to improve the community. Citizens participated in a written survey concerning their employment and housing and the types of development and policies they wanted for the future.

Citizens also participated in a Visual Preference Survey that allowed them to share their thoughts about appropriate and inappropriate types of development. Citizens used electronic voting keypads to vote on the images, and the results were displayed instantly. The keypad tool has been tremendously popular. At the Saucier town hall meeting, residents booed and applauded as the results appeared. For the planning team, it was an effective way to show that the team understood the community's culture and its goals for the future.

To ensure that the process was as inclusive as possible, students engaged in further outreach by canvassing rental properties and the FEMA trailer park for one-on-one dialogue with residents in these areas. Students have used a number of different tools for canvassing, including surveys and video recording of the properties and landscapes.

The planning team summarized the resulting feedback in the next community newsletter, which then created additional opportunities for a wider participation, especially from those citizens who had not yet been engaged in the planning process. Because the priorities that the citizens set are equivalent to the priorities identified in the plans, the information from the meeting set the foundation on which each community plan was based. The team then returned to Ohio State University to work on the plans. Every few weeks, the planning team provided the citizens steering committee with materials to review and comment on. An elected member of the Harrison County Board of Supervisors and the zoning administrator visited Columbus, Ohio, to review the students' draft plan before they sent it to citizens for review and comment.

About a month after the town hall meeting, the students made a draft plan available for review in the community both on line and in specific local venues. They also sent a newsletter to every property owner, summarizing the key policy and design choices in the plan, which enabled citizens to provide feedback that was then integrated into the draft plan.

Second Town Hall Meeting

The planning team hosted the second town hall meeting in Harrison County, where team members presented the revised draft and asked for feedback. The meeting followed the same process as the first town hall meeting, which included meeting citizens at a registration desk and guiding them through a mapping activity. A few important highlights of this meeting are described in the following paragraphs.

Team members received citizens' feedback using electronic voting keypads to vote on the identified goals, which showed the extent of community unity on specific goals. The planning team verbally mirrored the citizens' words; for example, citizens had said that they would like "to see businesses

look better," so the team used the words "to see businesses look better." By hearing their words repeated, the citizens could easily know that the team had listened to what they wanted. A team member would then explain the available alternatives—in this case, for example, the county could pursue sign standards for businesses. To measure the citizens' priorities of the planning strategies, the team used dot-voting via wall boards. As part of this process, citizens indicated their priorities by placing dots next to the strategies they supported. This tool allowed community members to see their neighbors' opinions and provided the opportunity to interact with the team members who were stationed at each strategy sheet.

Using citizens' feedback from the second town hall meeting, the team made final revisions to the plan and presented it to the Harrison County Board of Supervisors for adoption. The process is designed to create transparency and to communicate the citizens' needs throughout the plan. The citizen-participation process is fully documented in an appendix included in each plan. This documentation provides the opportunity for those citizens who may not have fully participated to understand how citizens were represented in the planning process.

Building Community Trust

One of the first priorities during the engagement process was to gain the community's trust. As planners from out of state and "up north," we had the responsibility to overcome this barrier as early as possible to establish a credible citizen engagement process.

The team members faced the realities and challenges of building trust when they arrived at the town hall meetings. At the Saucier meeting, the first citizen who arrived immediately got on his cell phone and started calling everyone he knew, telling them to get down here because there were folks from up north here and that could only be bad news. This feeling was not uncommon. The planning team regularly received questions about why the county would bring in people from up north. To overcome the barriers of being from a northern university, the team adopted two strategies. First, at the beginning of the first meeting, when Evans-Cowley introduced herself, she acknowledged the citizens' potential fear and anxiety they may have if outsiders, with whom they have had no previous relationship, impose their community's redevelopment on them. One of the main questions local residents raised at the outset of the planning process was why a school in Mississippi was not leading the planning efforts. Evans-Cowley pointed out that, because Mississippi has only one planning school and one architecture school, and those schools' resources were being directed to other local communities, the Board of Supervisors had asked for out-of-state support. She also explained that the focus of this process was not to tell the community what to do, but to listen to what they wanted and to translate that into a plan that the local Board of Supervisors could use.

On the positive side, because we were a university-based team rather than a consulting firm, citizens thought they were helping the students learn. They seemed to enjoy being around college students. After the citizens understood that the team was there to really listen to what they had to say, they were more open to sharing their opinions and participating in the planning process. This process is consistent with the idea that by building trust through engaging citizens, the result can mean enhanced social capital (Burby, 2003; Gruber, 1994; Innes, 1996).

Evaluating Progress

One year after Hurricane Katrina made landfall, the Ohio State team began to evaluate its team's work and the plans that had been developed in all Harrison County communities, including those of all the cities and the unincorporated communities. The goal was to evaluate the strengths and weaknesses of our team in comparison with others to determine what areas we needed to improve on and where we might best build on our work. We evaluated plans for integration of key principles for rebuilding, such as hazard mitigation, environmental protection from future storms, continuity with the principles of new urbanism, engagement of citizens, and the factual basis for making decisions, setting goals, and developing strategies. Overall, the authors believe the most important outcomes of the planning process are transparency and citizen engagement, a plan that recognizes and addresses natural hazards, a plan that recognizes the need to protect environmental resources, and a plan that is achievable.

Evaluation results of all the post-Hurricane Katrina rebuilding plans in Harrison County showed a wide range of attention paid to environmental and hazard mitigation concerns. Rebuilding plans for the cities in Harrison County were primarily completed by consultants who participated in the Mississippi Renewal Forum. Results from the environmental evaluation suggested that the plans created by Renewal Forum consultants were largely focused on urban design and failed to incorporate significant attention to the protection of the natural environment (Evans-Cowley and Gough, 2008). The *Community Plan for Pineville*, completed by Ohio State University, scored the highest on the environmental evaluation. Pineville has a large portion of its land area in wetlands. Its plan, which has a goal directly related to environmental protection, promotes a wide range of actions and implementation strategies to protect its abundant environmental resources. These environmental resources are viewed as assets to the community, providing potential for ecotourism. For example, the plan calls for developing boat launch areas for nonmotorized boats to enable residents and visitors to travel along Bayou Portage and stop in the town center for a meal (Harrison County, 2007a). The plan integrates environmental protection measures, and it is clear from the citizen-participation element that the residents strongly support this goal. When the team asked residents what they liked most about their community, they frequently mentioned the natural environment and beauty, trees, fishing, and rural character (Harrison County, 2007a). Although the plan received the highest rating in the evaluation for environmental protection, the authors found room for improvement based on a literature review on environmental planning.

Subsequent studio courses used a more sophisticated model for determining areas to protect from development, known as the Land Use Conflict Identification Strategy (Carr and Zwick, 2007). The *Community Plan for Henderson Point-Pass Christian Isles* received the highest overall score for hazard mitigation (Evans-Cowley and Gough, 2007a) Henderson Point was the most heavily impacted community in Harrison County, with 100 percent of the community impacted by up to 30 feet of storm surge. The plan has several goals directly related to hazard mitigation, and it promotes a wide range of actions and implementation strategies to create a more disaster-resistant community (Harrison County, 2007b). One might expect this community to have a strong hazard mitigation angle to its plan because only 24 homes were left standing after Hurricane Katrina came ashore (Mixon, 2006). The plan identifies the location of hazards, describes the characteristics of hazards, assesses the population exposed, and describes the environmental impacts of the disaster.

One challenge of incorporating hazard mitigation elements into the Harrison County plans was dealing with citizens' disinterest. For example, although the Henderson Point plan integrates hazard mitigation measures, citizens who wanted to rebuild their community the way it had been showed little interest in hazard mitigation. They did not support the Advisory Base Flood Elevations, which required houses to be built up to 25 feet above ground level. Also, citizens rejected proposals by the U.S. Army Corp of Engineers (USACE) to build a levy for the community. Although the *Community Plan for Henderson Point-Pass Christian Isles* addresses the hazards in the communities and sets goals and policies to support efforts to address them, the potential for devastating loss from rebuilding attempts if another hurricane hits is enormous because nearly all the land area is in a 100-year flood zone. Research has found that it is often difficult to engage citizens in discussions of hazard mitigation (Birkland, 1996; Burby, 2003). This finding proved to be a serious challenge for the students who wanted to protect the community to the greatest degree possible but had to respect the citizens' strong ties to the land and need to rebuild their community. Ultimately the students found that the most effective way to engage in discussions about environmental protection and hazard mitigation was to frame the issue around their values and concerns. For example, in DeLisle and Pineville, the same tools that promote hazard mitigation and environmental protection also promote the preservation of rural character. By talking to citizens about tools for rural preservation, the students found much higher levels of support than if they had discussed the tools in the context of hazard mitigation.

In evaluating the planning process, the planners clearly realized that they need to work closely with the emergency managers to implement land use policies and capital improvement investments that can effectively protect communities from future disasters. In all cases, the evaluation of post-Hurricane Katrina community plans exposed areas for improvement in environmental protection and hazard mitigation. In their dialogue with citizens, planners need to acknowledge the realities and concerns of the long-range protection of these communities and their environment. Harrison County communities should integrate the planning documents prepared by the local government's emergency management office, FEMA, USACE, and other organizations into their own long-range plans as a means for better addressing environmental and hazard mitigation elements. The Mississippi Development Authority recently approved funding for further comprehensive planning for communities along the Mississippi Gulf Coast. This additional funding should allow for implementation of environmental and hazard mitigation policies and strategies and is critical to the long-range protection of communities.

Balancing Educational and Community Objectives

Each studio course was structured to provide learning experiences that combined intense, direct community service with explicit learning objectives, preparation, and reflection (Dewey, 1948; Kolb, 1984). For example, each course required students to prepare weekly journal entries reflecting on what they were learning, and, at points throughout the quarter, students reflected on the conflicts between what they viewed as good planning, what the community wanted, and what political constraints existed. Providing opportunities throughout the quarter to reflect on learning objectives helped students focus not just on the community plan, but also on what they were learning. One of the biggest challenges for the instructor was the overwhelming long-term plan-

ning needs for Harrison County. There were always many more projects that the county needed help with than there was time available to complete them. Almost weekly, the county asked the team to take on more work. It was critical for the instructor to try to balance the educational objectives with the county's needs. Fortunately, the county mainly needed long-range community planning, which was an ideal fit for the learning objectives of the comprehensive planning studio course. Throughout the planning process, educational objectives had to be balanced with community objectives. For example, the Southern Mississippi Planning and Development District (SMPDD) approached the planning team with an idea to create a senior village to address the affordable housing needs of seniors, which is a universal issue for most communities. SMPDD, in working with the consulting firm PBS&J, secured a commitment from the firm to donate at least 35 green mobile homes. These mobile homes have an environmentally friendly design and meet requirements for accessibility according to the Americans with Disabilities Act. They are available as part of the Mississippi Cottage program. SMPDD had identified a site known as the County Farm (a 640-acre property given to Harrison County) as a location for the development. They asked the planning team to develop a site plan for the project. Although citizens expressed strong support for a senior village, they did not support locating the village at the County Farm. As a result, the instructor was in a quandary. Should the students develop a site plan without a site or should the team stop and redirect its attention elsewhere? The instructor thought it would be a valuable learning exercise to design a conceptual site plan, develop a partnership proposal on how the county might participate, conduct a market analysis, and develop an initial pro forma (see exhibit 1). The students then provided the site plan, proposal, and analysis to SMPDD and PBS&J,

Exhibit 1

A Site Plan for a Senior Village

This conceptual site plan integrates 50 green mobile homes and an assisted-living facility on a 10-acre site. Credit: Matthew Leasure.

who used the materials to make a presentation to the Harrison County Board of Supervisors on how a senior village could be developed. As of October 2008, SMPDD is seeking a site that could be used for the project. Ultimately, the project met educational objectives and a community need.

In another case, the county strongly desired that the planning team work on the Scenic Byway application for the designation of State Highway 605. The students participating in the studio were already very busy working on the community plan for this area. Although preparing an application would be a learning exercise for the students, the instructor thought it was inconsistent with the learning objectives of a comprehensive planning studio. After ongoing discussions with the county, the county decided to reallocate staffing resources and hire a student intern from Ohio State to specifically focus on the application rather than making it a studio activity.

Although challenges always existed to balance educational requirements and the needs of Harrison County, the overall goal of combining direct community service and learning is to transform classroom learning into skills the students can use to make a difference in the community—in this case, Harrison County (Eyler, Giles, and Braxton, 1997). At the end of the planning process, the university hopes that, as a result of working with the communities in Harrison County, the students will have positive attitudes toward their own communities, greater involvement in politics, and instilled values of citizenship (Ahmad-Llewellyn, 2003; Hunter and Brisbin, 2000; Kirlin, 2002). In reviewing the students' journals, instructors found that their attitudes toward citizen engagement had clearly changed. Although at the beginning of the course students viewed citizen participation as an important part of planning, by the end of the process they understood how engaging citizens could result in a truly positive transformation for a community.

Obstacles to Success

The university team faced a number of challenges in executing the participatory planning process. An initial challenge was how to reach out to citizens who had been displaced by the hurricane. For example, in DeLisle, the Post Office was not delivering mail to individual addresses. Instead, recipients had to go to a central post office outside of their community to get their mail. Those living outside the community were often moving from place to place, and they were not necessarily having their mail forwarded. Phones were of limited use because some people were still living in tents. The team used a variety of citizen outreach approaches as described in the previous sections but also reached out to area churches and businesses and used word of mouth to promote the process.

It is important to note that this rebuilding effort provided the first opportunity for these communities to participate in a planning process. Harrison County adopted its first comprehensive plan in 1999. It was prepared to allow for the adoption of zoning, but it did not include any effort to engage citizens in planning for their future. Citizens in general were skeptical about the value of planning and some equated zoning with communism. These attitudes posed as big of a challenge as convincing citizens that outsiders were not intent on imposing decisions on them. In part, this opposition to planning was based on a lack of understanding about how planning could benefit their communities. To gain the community's trust, the team avoided using planning terms and instead used the citizens' own words. The largest concern of most citizens was that their rural lifestyle be maintained. The team would make statements such as, "you told us that you wanted to

make sure that the community maintains its farming areas." The team would then offer alternatives for achieving this. The citizens understood that growth was inevitable, but they were generally concerned about how such growth would ruin their communities. The planning process helped them understand that by making decisions about where growth could happen, they could use planning and zoning to effectively achieve their goal of preserving rural areas.

The students struggled to appropriately frame the plans to overcome obstacles encountered throughout the planning process (Argyris, Putnam, and Smith, 1985; Dewey, 1948; Kolb, 1984; Lewin, 1951; Schon, 1983; Whyte, 1991, 1984). The students repeatedly experienced conflicts between what they saw as good planning and what the citizens wanted. The students struggled to understand the citizens' perspective. For example, in DeLisle, where 90 percent of the housing was impacted by storm surge, the students could not understand why citizens wanted to rebuild the same houses that they had before the hurricane. The instructor pointed out that the citizens strongly value both the very low-density character of their community and the scenic rivers and bayous. The citizens' values were not grounded in hazard mitigation; they were grounded in rural preservation. By framing solutions around rural preservation, the team could help the citizens' achieve their goals and, at the same time, could fulfill its own desire to implement hazard mitigation measures.

Lessons Learned

Any community, whether or not it is facing a disaster, could use the planning process used in Harrison County. By using an empowerment planning approach, the team effectively engaged citizens in planning and provided them with the power to implement their plans. The planning process employed in Harrison County offers a number of lessons learned from both the community and university perspectives.

Community Lessons

Although students can help during a planning process, when the course is over, they move on. A critical element of this planning process was to create a way to give citizens the ability to carry on with the plan after the students had gone. A problem that any community faces in working with a consultant is having the local will and energy to move the plan forward. The planning process must be designed to build community capacity for implementation.

Creating a good plan is only the starting point. A major component of the planning process in Harrison County was to build planning capacity in each community. At each meeting, people were asked to sign up to volunteer to assist the steering committee with implementation of the plans. The county-appointed steering committees, after completion of each plan, are charged with forming a nonprofit organization to implement the plans. Finding the time and energy to volunteer to help with planning has been a real struggle for community members who are trying to rebuild their own lives and have little time for other activities. In every community, however, committed people have made it a priority to ensure that the plans are implemented. These individuals have formed community organizations that have led to the implementation of the plans. For example, the Saucier Improvement Association started a farmers market (exhibit 2). In Pineville, a property

Exhibit 2

Community Organization Starts Farmers Market

As a first action, the Saucier Improvement Association initiated a twice-weekly farmers market. This image shows the ribbon cutting for the farmers market kickoff. Photo credit: Steve Howard.

owner applied for and was selected for the pilot Leadership for Energy and Environmental Design for Neighborhood Development program. In DeLisle, a property owner worked with a land trust to place a property along the bayou in permanent conservation.

University Lessons

From the university perspective, the project has created numerous learning opportunities for students and faculty. Cultural bias was a significant issue upfront. Students' expectations for what citizens should want initially proved to be a barrier to good planning. Over time the students learned how to set aside their own values and embrace those of others. To help the students overcome their biases, at the end of the first day in Mississippi, the faculty facilitated a debriefing session with each class of students in which the students spoke of their first impressions. Student comments created opportunities for discussions on differences in cultural values between themselves and local residents. In addition, local residents provided the students with tours through the community to help students deepen their understanding of the relationship between individual and family lifestyles and the cultural context of a given community.

The project has affected students emotionally. Crying has been a common experience throughout the planning process, and anger and frustration has often been taken out on teammates. These behaviors are in part from mental exhaustion but also are the result of being overwhelmed by the personal situations of residents in Harrison County (Evans-Cowley, 2006). Although the instructor

initially was not prepared to counsel the students through this emotionally challenging experience, she initiated a project in which each past class contributed to a "Mississippi Survivor's Guide" that offers helpful advice on how to work with teammates, the community, officials, stress, and the culture of the coast. The guide helps prepare upcoming students for their experience. A greater focus on reflective journaling later in the project's evolution also helped students with this aspect of their learning process.

The students and faculty learned the extreme importance of personal connections to gain information. Harrison County is a relatively closed society whose citizens do not return phone calls or e-mails unless they know the person or have a connection with the person. This attitude of exclusiveness created extreme difficulties for the students who expected they could call someone at the last minute and get an appointment before their first trip to the Gulf Coast. Students quickly realized that it was vital to create a network of people on the coast who could provide information and then use this small network to gain introductions to other people who could provide information.

Overall, the experience for the students and faculty involved has been one of tremendous learning and opportunity for professional growth. Although the goal of the course was to benefit the citizens of Harrison County, students and faculty have also experienced tremendous personal benefits. The students have departed feeling a close and personal connection to the Mississippi coast, with some of the students returning on vacation to see the progress and visit with the people they met in the community.

Conclusion

The approaches the authors used in this planning process could be used to address many postdisaster recovery situations and in any typical community planning process. The result of the Harrison County planning process has been that Harrison County has adopted each plan, with the support of the citizens in each community. The planning team repeatedly heard citizens who had attended planning meetings in other communities say, "you are doing it right"—meaning that the teams were asking people what they wanted and not telling them what to do. The mayor of nearby Long Beach said he was impressed that the planning team had actually listened to what the community wanted, and he wished that he had a school like Ohio State University working with his community (Skellie, 2007). In Harrison County, the citizens ultimately decided what their future would be. The plans created out of the HUD Universities Rebuilding America Partnerships grant program have received a number of awards from the Small Town and Rural Planning Division of the American Planning Association, the Economic Development Division of the American Planning Association, the Ohio Planning Conference, and the Congress for the New Urbanism.

The county has been so satisfied with the efforts of Ohio State University that they have awarded additional grant funds to further the work of the university. In 2006, they added Ohio State University as a subcontractor on a Coastal Impact Assistance Program grant (through the National Oceanic & Atmospheric Administration). The result was a countywide Smart Growth Resource Guide, which was selected for an Innovator Award from the National Association of Development Organizations. The county selected Ohio State University to receive a competitive bid contract through the Mississippi Development Authority grant program to prepare the county's compre-

hensive plan, Sand-Beach Master Plan, and revise the county's zoning and subdivision regulations, all of which will continue the partnership through 2009. In the end, Harrison County found that selecting a university resulted in an ideal partnership that has led to a long-term relationship for providing substantial design and planning assistance.

Acknowledgments

This article is based on research supported by the U.S. Department of Housing and Urban Development through the Universities Rebuilding America Partnerships grant program number URAP-05-OH-039.

Authors

Jennifer S. Evans-Cowley is an associate professor of city and regional planning at The Ohio State University.

Meghan Zimmerman Gough is an assistant professor of urban planning at Virginia Commonwealth University.

References

Ahmad-Llewellyn, Shahara. 2003. "From Knowledge, to Service, to Citizenship," *Phi Delta Kappan* 62 (1): 62.

Alinsky, Saul D. 1971. *Rules for Radicals: A Practical Primer for Realistic Radicals*. New York: Vintage Press.

Argyris, Chris, Robert Putnam, and Diana McLain Smith. 1985. *Action Science: Concepts, Methods, and Skills for Research and Intervention*. San Francisco: Jossey-Bass Publishers: 80–102.

Arnstein, Sherry R. 1969. "A Ladder of Citizen Participation," *Journal of the American Institute of Planners* 35 (4): 216–224.

Birkland, Thomas A. 1996. "Natural Disasters as Focusing Events: Policy Communities and Political Response," *International Journal of Mass Emergencies and Disasters* 14 (2): 221–243.

Bonck, Patrick. 2005. Harrison County zoning administrator. Personal interview (November 7).

Burby, Raymond J. 2003. "Making Plans that Matter: Citizen Involvement and Government Action," *Journal of the American Planning Association* 69 (1): 33–49.

Carr, Margaret, and Paul Zwick. 2007. *Smart Land-Use Analysis: The LUCIS Model*. Redlands, CA: ESRI Press.

Creighton, James L. 1992. *Involving Citizens in Community Decision Making: A Guidebook*. Washington, DC: Program for Community Problem Solving.

Dewey, John. 1948. *The Need for a Philosophy of Education, in Experience and Education*. New York: Macmillan: 25–31.

Evans-Cowley, Jennifer. 2006. "Preparing Students for Disaster: A Framework for Engaging in Service-Learning in Post-Katrina Mississippi," *Journal of Higher Education Outreach and Scholarship* 12 (1): 109–124.

Evans-Cowley, Jennifer, and Meghan Gough. 2008. "Evaluating Environmental Planning in Post-Katrina Plans in Mississippi," *Journal of Environmental Planning and Management* 51 (3): 399–419.

Evans-Cowley, Jennifer, and Meghan Gough. 2007a. "Is Hazard Mitigation Being Incorporated into Post-Katrina Plans in Mississippi?" *International Journal of Mass Emergencies and Hazards* 25 (3): 177–217.

Evans-Cowley, Jennifer, and Meghan Gough. 2007b. "Transforming Top-Down to Bottom-Up Planning in Post-Katrina Mississippi," *Progressive Planning* (Summer): 13–17.

Eyler, Janet, Dwight E. Giles, Jr., and John Braxton. 1997. "The Impact of Service-Learning on College Students," *Michigan Journal of Community Service Learning* 4: 5–15.

Forester, John. 1999. "Challenges of Mediation and Deliberation in the Design Professions: Practice Stories from Israel and Norway," *Journal of Architectural and Planning Research* 16 (2): 116–132.

Godschalk, David R., Samuel Brody, and Raymond Burby. 2003. "Public Participation in Natural Hazard Mitigation Policy Formation: Challenges for Comprehensive Planning," *Journal of Environmental Planning and Management* 46 (5): 733–754.

Godschalk, David R., David W. Parham, Douglas R. Porter, William R. Potapchuck, and Steven W. Schukraft. 1994. *Pulling Together: A Planning and Development Consensus-Building Manual*. Washington, DC: Urban Land Institute.

Gruber, Judith. 1994. "Coordinating Growth Management Through Consensus-Building: Incentives and the Generation of Social, Intellectual, and Political Capital." Working paper no. 617. University of California, Berkeley Institute of Urban and Regional Development.

Harrison County. 2007a. *Community Plan for Pineville*. http://www.co.harrison.ms.us/departments/zoning/downloads.asp (accessed January 20, 2007).

Harrison County. 2007b. *Community Plan for Henderson Point-Pass Christian Isles*. http://www.co.harrison.ms.us/departments/zoning/downloads.asp (accessed January 20, 2007).

Hunter, Susan, and Richard A. Brisbin, Jr. 2000. "The Impact of Service Learning on Democratic and Civic Values," *PS: Political Science and Politics* 33 (3): 623–626.

Innes, Judith E. 1996. "Planning through Consensus Building: A New View of the Comprehensive Planning Ideal," *Journal of the American Planning Association* 62: 460–472.

Innes, Judith E., and David E. Booher. 1999. "Consensus Building and Complex Adaptive Systems," *Journal of the American Planning Association* 65 (4): 412–423.

Innes, Judith E., Judith Gruber, Robert Thompson, and Michael Neuman. 1994. "Coordinating Growth and Environmental Management through Consensus Building." CPS Report: A Policy Research Program Report. University of California at Berkeley: California Policy Seminar.

Julian, David, Thomas M. Reischl, Richard V. Carrick, and Cathy Katrenich. 1997. "Citizen Participation—Lessons Learned from a United Way Planning Process," *Journal of the American Planning Association* 63 (3): 354–355.

Kirlin, Mary. 2002. "Civic Skill Building: The Missing Component in Service Programs," *PS: Political Science and Politics* 3 (5): 571–575.

Kolb, David A. 1984. *Experiential Learning: Experience as the Source of Learning and Development*. Englewood Cliffs, NJ: Prentice Hall: 39–60.

Lewin, Kurt A. 1951. *Field Theory in Social Sciences*. New York: Harper and Row.

Mixon, George. 2006. Harrison County, Mississippi, fire chief. Personal correspondence (January 5). Mailing address: 20121 West Wotham Road, Saucier, Mississippi 39574.

Moore, C. Nicholas. 1995. *Participation Tools for Better Land-Use Planning: Techniques and Case Studies*. Sacramento: Local Government Commission.

Reardon, Kenneth. 2000. "An Experiential Approach to Creating an Effective Community-University Partnership: The East St. Louis Action Research Project," *Cityscape* 5 (1): 59–74.

Schon, Donald. 1983. *The Reflective Practitioner: How Professionals Think in Action.* New York: Basic Books.

Skellie, William. 2007. Mayor, city of Long Beach, Mississippi. Personal interview (September 5).

Thompson, Richard. 2005. "Mississippi Tackles a Tough One," *Planning* (December): 6–11.

U.S. Department of Housing and Urban Development (HUD). 2006. "Universities Rebuilding America," *Research Works* 3 (5): 1–2.

Whyte, William F. 1991. *Participatory Action Research*. Newbury Park, CA: Sage Publications.

Whyte, William F. 1984. *Learning from the Field: A Guide from Experience*. Newbury Park, CA: Sage Publications.

Wondolleck, Julia, and Steven Yaffee. 2000. *Making Collaboration Work: Lessons from Innovation in Natural Resource Management*. Washington, DC: Island Press.

Building Local Capacity: Planning for Local Culture and Neighborhood Recovery in New Orleans

Jacob Wagner
Michael Frisch
University of Missouri-Kansas City

Billy Fields
The University of New Orleans

Abstract

How can successful partnerships for advocacy planning be formed and sustained in a postdisaster environment? What roles can university-community partnerships play to create a more equitable and sustainable city while retaining the qualities of local culture that make New Orleans distinct? This article describes an innovative partnership between The Urban Conservancy and the Department of Architecture, Urban Planning and Design at the University of Missouri-Kansas City that is focused on local culture as the foundation for disaster recovery and economic renewal. Cultural heritage offers an alternative framework for recovery planning that prioritizes local culture and the historic built environment as essential to the city's identity and recovery. Successful partnerships in a city like New Orleans require local knowledge, respect for local culture, and an understanding of local politics. In this context, a partnership informed by mutual respect with a goal of local capacity building was a useful approach to the university-community partnerships model.

Introduction

Among cities in the United States, New Orleans is one of the most distinctive places with a deep history of urbanism and cultural diversity. When viewed in the context of suburbanization and homogenization in the post-World War II era, the distinctiveness of the city's *creole urbanism* is even more pronounced (Wagner, 2008; Hirsch and Logsdon, 1992). While the historic character

of the city's neighborhoods provides the basic framework for everyday life, it also serves as the foundation for the tourism industry, one of the dominant sectors of the New Orleans economy (Whelan, 2006). In the wake of Hurricane Katrina and the levee failures, however, much of the historic urban fabric and the city's cultural heritage are threatened.

Although Hurricane Katrina and the failure of the federal hurricane protection system created a housing crisis of epic proportions, rebuilding has required more than rehabilitating the city's housing stock. Because of the sheer size of the area impacted by floodwaters and the preexisting conditions in the city's neighborhoods, recovery planning has required a multidimensional focus on local culture, infrastructure planning, and community economic development.

This article describes an innovative approach to community planning and design in New Orleans focused on local culture as the foundation for disaster recovery and economic renewal. Funded by the U.S. Department of Housing and Urban Development's (HUD's) Office of University Partnerships (OUP), the project involves an ongoing partnership between The Urban Conservancy in New Orleans and the Department of Architecture, Urban Planning and Design, at the University of Missouri-Kansas City (UMKC). Additional partners include the Friends of Lafitte Corridor (FOLC), the Mid-City Neighborhood Organization (MCNO), the Rails-to-Trails Conservancy, and The University of New Orleans.

The research addresses two questions: (1) How can successful partnerships for advocacy planning be formed and sustained given the challenges of working in a postdisaster environment? (2) What is the role of university-community partnerships in rebuilding a more equitable and sustainable city that retains the qualities of local culture that make New Orleans distinct? This article presents the partnership's efforts in the areas of economic development, heritage tourism, and planning for neighborhood recovery. It evaluates the context in which the university-community partnership developed and the challenges the partners faced in their efforts to advocate for a sustainable and equitable recovery process.

Context

Following the disaster of Hurricane Katrina, the city of New Orleans was in a dire situation. According to data compiled by the Federal Emergency Management Agency (FEMA) and the Small Business Administration (SBA), more than 105,000 housing units in Orleans Parish experienced major or severe flood damage. This number alone is staggering—Orleans Parish experienced more damaged housing units from the disaster than the states of Mississippi, Alabama, Texas, and Florida combined (HUD, 2006). Impacts to businesses were also severe in Orleans Parish. State reports show that Orleans Parish lost 2,564 employers in the first year following the disaster—the highest total loss in the state (Terrell and Bilbo, 2007). The Louisiana Department of Culture, Recreation and Tourism reported that the tourism industry in New Orleans was losing upwards of $15 million per day in revenues from lost tourism and hospitality activity following the disaster (Louisiana Department of Culture, Recreation and Tourism, 2005a).

In addition to these impacts and the disaster's broad geographic scope, the mass evacuation caused by the disaster created a financial crisis that left local government paralyzed and near bankruptcy. Although both Mayor C. Ray Nagin and Governor Kathleen Blanco acted quickly to establish

rebuilding commissions, the city government had limited capacity to rebuild. Mayor Nagin's decision to lay off an estimated 3,000 "nonessential" employees in October 2005, including two-thirds of the city's planning staff, had a serious effect on the ability of the city's planning and housing agencies to function (Eggler, 2005).

In New Orleans, the recovery process included three phases of planning led by different organizations, including the Action Plan to Rebuild New Orleans, prepared by Wallace, Roberts & Todd, LLC Planning and Design for the Bring New Orleans Back Commission (BNOBC); the New Orleans Neighborhoods Rebuilding Plan (NONRP), prepared by consultant teams under the contract of Lambert Advisory for the City Council; and the Unified New Orleans Plan (UNOP) developed by multiple planning consultants under the direction of the Greater New Orleans Foundation with substantial funding and support from the Rockefeller Foundation. Each plan served a specific purpose and dealt with the challenge of citywide recovery in different ways, given the tensions inherent in postdisaster planning that was highly politicized (Wagner, 2006; Nelson, Ehrenfeucht, and Laska, 2007).

By January 2006, the policy direction from City Hall suggested an approach in which each neighborhood would have to prove its viability (Russell and Donze, 2006). In this context, many neighborhood organizations struggled to get their recovery planning process going with little or no input from the city planning staff. Local nonprofit organizations also struggled to recover from the disaster and to rebuild their operations. Given this environment, many universities began to partner with local nonprofits and neighborhood organizations to develop plans that would demonstrate a neighborhood's ability to rebuild.

University-Community Partnerships Literature

Before the disastrous events of August 29, 2005, the university-community partnership approach at HUD's OUP had demonstrated 10 years of encouraging universities to participate in service learning. These university collaborations with local organizations included applied research in the areas of public education, community development, urban planning, and architecture/community design (Baum, 2003; Feld, 1997; Pearson and Robbins, 2002).

The universities that OUP selected for the Gulf Coast Universities Rebuilding America Partnerships grants in March 2006 represented a mix of these areas of partnership. Our work falls under the heading of community design, because the actual practice has been a mix of neighborhood advocacy planning, local economic development, heritage tourism planning, and urban (greenway) design. Community design is increasingly recognized as a practice with the potential to create more sustainable design solutions that are the product of local knowledge and professional expertise (Blake, 2003; Hester, 1984; 2006).

Insights From the Disaster Recovery Literature

The relationship among urban planning, urban design, and disasters has long been a focus of scholarly research. Kevin Lynch's work *What Time Is This Place?* (1972) provides a landmark exploration of the questions surrounding environmental change in cities. Lynch argues that the purpose of urban planning is fundamentally related to the management of change. Rather than

suggesting that the disaster created a "clean slate" in New Orleans, Lynch's work affirms the reality that planning in the context of a postdisaster environment is a far more complex task of managing environmental change in a historic city (Wagner, 2008).

Haas, Kates, and Bowden (1977) provide a four-stage model to describe the basic phases of the disaster recovery process: (1) emergency response (search and rescue operations), (2) restoration (reopening basic services and rebuilding infrastructure), (3) reconstruction I (return to predisaster economy and population), and (4) reconstruction II (memorialize the losses and build for the future). According to these authors, each phase of the process takes about 10 times longer than the previous phase, and the extent of local planning along with government capacity affects the timing of recovery in a particular place (Burke and Beatley, 1997; Vale and Campanella, 2005). Our partnership, which developed near the end of the emergency response phase (November to December 2005) and very early in the restoration phase, was informed by the long-term planning necessary to move the city toward reconstruction. Such planning must recognize that disasters both magnify preexisting social problems and inequities, and create dynamic new situations (Drabek, 1986; Laska and Morrow, 2006; Deyle et al., 1998).

Because our partnership was developed with a holistic view of neighborhood recovery, our team emphasized local business assistance as a key part of the recovery process. Disaster recovery greatly changes the local business environment, and these changes occur at the metropolitan and neighborhood levels. Some local businesses adapt to new conditions and thrive, while others survive the immediate disaster only to fail at surviving the recovery process (Alesch et al., 2001). Given this knowledge of the challenges of disaster recovery and the importance of local business to the city's economy and culture, our team included a strong business recovery component in its research and planning, including the Stay Local! program and a business recovery workshop (described below).

Building the Partnership

The collaboration began in November 2005 with coordination for an urban planning studio course in the Department of Architecture, Urban Planning and Design at UMKC in the spring semester of 2006. The leadership of The Urban Conservancy and faculty at UMKC developed a strategy that would meet the needs of the local organization while addressing the educational objectives of a studio-based, urban planning program. The partnership was based on the preexisting professional networks of Dr. Jacob A. Wagner, who had lived and worked in New Orleans from 1999 to 2004. These contacts included Ed Melendez, a founder of The Urban Conservancy. Wagner's and Melendez's common values and attitudes toward the economy and culture of New Orleans provided a basis for the collaboration. From the beginning, the team took the approach that the student work would be pragmatic by generating real projects and solutions that the local partner could implement in collaboration with other organizations.

Faculty traveled to New Orleans in December 2005 to meet with The Urban Conservancy and to tour the city's neighborhoods. Our approach acknowledged that New Orleans would continue to depend on tourism as a significant driver of the local economy and that the urban fabric of the city's historic neighborhoods was not only worthy of restoration but a necessity for the recovery of local culture and commerce. As such, our planning process sought new strategies to diversify the

city's economy while seeking to more evenly distribute the economic benefits of tourism through a heritage tourism strategy.

Before the disaster, The Urban Conservancy could be characterized as a "next generation" preservation group—one that defines preservation as including both the people in a neighborhood as the generators of local culture and the distinctive built environment. Through their activism and programs, The Urban Conservancy defined this approach to preservation at an urban scale rather than an architectural scale (Melendez and Coats, 2004). Pre-Hurricane Katrina, The Urban Conservancy's role in New Orleans had been to spark dialogue about local economic development and to ask the question: How do you achieve sustainability in a very practical sense within New Orleans' neighborhoods? The organization realized that sustainable development requires moving the community to address issues such as poverty, affordable housing, and other key concerns.

This interrelationship between local culture and historic neighborhoods became heightened as the extent of damage in New Orleans was assessed and the long work of disaster recovery began (Piazza, 2005). UMKC faculty had expertise in neighborhood planning, community development, historic preservation, and regional economic planning. Consultants with expertise in disaster planning and transportation planning were added to the partnership. The four objectives of the university-community partnership included the following:

1. Rebuild the local capacity of citizens, business owners, and community leaders to plan for and implement economic recovery and housing resettlement.
2. Identify heritage tourism nodes in the city and plan for their long-term recovery.
3. Create a plan to attract funding for redevelopment.
4. Develop policy recommendations that will inform the reconstruction process while maintaining the distinct culture of New Orleans.

The original work program proposed a series of plans for three heritage tourism nodes as well as additional tasks to be performed by the university and local partner, including the launch of Stay Local!—an advocacy program for strengthening the local economy.

Why Heritage Tourism?

Cultural heritage offers a different lens for viewing land use and planning decisions that prioritizes local culture and the historic built environment as intrinsically important and essential to the city's identity and recovery (Hayden, 1995). Heritage tourism recognizes the diversity of people who travel to the city and builds on the city's unique neighborhoods, landmarks, and cultural sites to attract visitors. The historic neighborhoods of New Orleans provide diverse attractions for locals and visitors alike, and yet most visitors rarely venture beyond the "tourist bubble" of the French Quarter and Garden District (Judd and Fainstein, 1999).

In the past, the city and the private sector have promoted tourism in New Orleans without much coordination with land use planning or neighborhood participation, despite the fact that such coordination could significantly affect neighborhoods that experience an increase in tourism development (Foley and Lauria, 2003). Vesey's work (1997) shows how local businesses shift over

time to address the tourism market while resident-oriented businesses decline. A new strategy of heritage tourism requires a more deliberate approach to tourism planning that combines distinct local goods and services with public infrastructure investment. The reestablishment of the Canal Streetcar line in 2004, for example, indicates a commitment to tourism as an economic development strategy that should be coordinated with land use planning in the neighborhoods along the streetcar line.

Given the impact of the disaster on the city's historic neighborhoods, our team believed that heritage tourism provides an approach to place-based economic development that is compatible with the unique qualities of local culture. New Orleans includes 22 historic districts of national and local significance, and hundreds of landmarks that define the city's sense of place. Potential attractions are spread throughout the city, although many sites of significance are unknown and often remain unrecognized as opportunities for tourism. Further, in light of the disaster, the team believed that the continuity of the city's historic neighborhoods would be more important than ever because the familiar landmarks and urban fabric provide a counterbalance to the great physical destruction that occurred in the city.

Initial Studio and Planning Research

In January 2006, UMKC began an urban planning studio focused on developing a plan for neighborhood recovery that emphasized heritage tourism. Studio faculty decided that students needed to have an intimate understanding of the city's history for the process to be successful. The work of the studio was organized in three phases. After each of the first two phases, students presented to an interdisciplinary steering committee of Kansas City residents with experience in New Orleans. Having a repository of local knowledge about New Orleans in the steering committee was necessary to direct the plans and designs of relatively inexperienced students.

In phase one, students were assigned readings on New Orleans to begin the process of learning the complexities of the historic city and to prepare for their first trip to the city at the end of January 2006. Students read and critiqued three recovery plans generated for New Orleans immediately after Hurricane Katrina.[1] Using a Geographic Information System (GIS), students mapped historic districts, neighborhood services, and institutions using data from the city's Land Use Plan (New Orleans City Planning Commission, 1999), neighborhood plans (Brooks and Wagner, 1999; Dufour and Gladstone, 2004; Lauria et al., 1996), architectural histories of the city, and local phone and tourist directories.

From these sources, the team identified *heritage tourism nodes*—areas with clusters of historic resources, places of interest, and local businesses. Historic district boundaries were overlaid with these clusters, and 11 nodes were selected for analysis. The identified heritage tourism nodes (exhibit 1) were Oak Street/Carrollton, Freret, OC Haley, Back O' Town, Mid-City, Fair Grounds/Jazz Fest/Bayou St. John, Tremé, St. Roch/New Marigny, Algier's Point, Holy Cross, and Gentilly.

[1] See Urban Land Institute (2005), American Planning Association (2005), BNOB Commission (2006), and Louisiana Department of Culture, Recreation and Tourism (2005a).

An additional linear element—the Lafitte Corridor—was identified for greenway development following a rail corridor and canal that once served as the city's connection to the Gulf of Mexico. Students presented their initial findings from their first research trip to the steering committee in February 2006. After this meeting, the team selected Tremé and Mid-City for their proximity to the Lafitte Corridor, which provided a direct connection between the two heritage areas (see the section about the Lafitte Greenway).

Phase two consisted of data collection and analysis, and the development of preliminary plans and designs for the three nodes: Tremé, Mid-City, and the Lafitte Corridor. The second study trip occurred in early March 2006. Students and faculty met with MCNO, local planners, and residents. Students walked each node to document open and closed businesses, inventory current land uses and infrastructure conditions, and record the extent of flood damage. Students reported back to the steering committee in late March 2006. The Tremé neighborhood was presented as one heritage tourism area, while Mid-City was separated into four sub-areas due to its size.

Exhibit 1

Map of Heritage Tourism Nodes in New Orleans as Identified by UMKC With The Urban Conservancy, March 2006

UMKC = University of Missouri-Kansas City.

Heritage tourism nodes: (1) Oak Street/Carrollton, (2) Freret, (3) OC Haley, (4) Back O' Town, (5) Mid-City, (6) Fair Grounds/ Jazz Fest/Bayou St. John, (7) Tremé, (8) St. Roch/New Marigny, (9) Algier's Point, (10) Holy Cross, and (11) Gentilly.

Phase three of the studio consisted of using the steering committee's comments to produce final plans and designs for the local partner and other project stakeholders in New Orleans. In May 2006, our team made two public presentations, including all of the research and data that the team developed, with planning, design, and policy recommendations that set the stage for future collaboration with The Urban Conservancy and additional partners.

Rebuilding Local Capacity and Moving Into Plan Implementation

After completing the urban planning studio in May 2006, faculty collaboration with local organizations continued. Moving beyond the identification of heritage tourism nodes across the city, the team focused their implementation efforts on the following components:

1. Collaborating with The Urban Conservancy on local business recovery, including the Stay Local! program and other projects that would help advocate for local economic development.
2. Completing a heritage tourism plan for Mid-City and working with the Mid-City Neighborhood Organization to support recovery planning efforts in one of the city's most devastated neighborhoods.
3. Working with the Rails-to-Trails Conservancy and FOLC to plan and implement the Lafitte Greenway.

University Collaboration With Local Partner: The Urban Conservancy

Disasters affect organizations as well as residents and the built environment. The Urban Conservancy lost records and board members dispersed as a result of the flood. In New Orleans, university faculty met with the board and new staff of The Urban Conservancy to strengthen the Stay Local! program and implement the heritage tourism plans. During this period, contact between the university and the organization occurred almost daily.

Given the mission of the local partner, the interests of the organizations' new director, and conditions on the ground, local business recovery became the primary focus of the collaboration following the completion of the studio. While faculty continued to develop strategies to rebuild the city's tourism economy, neighborhoods and residents required basic services. The return of local businesses across the city was an essential component of citywide recovery.

Stay Local! Organizes Local Businesses

Before the disaster occurred, the local partner had developed a new program—Stay Local!—to identify and map local businesses; create an online database of locally owned firms; and advocate for a sustainable local economy. In the postdisaster context, the need for this type of local business network was even greater, as the organization identified a need for collaborative marketing strategies in support of local business recovery and to raise awareness about the importance of buying locally to rebuild the city's economy.

Given the lack of reliable information about the city's recovery, the partnership also recognized the importance of providing visual evidence of business recovery at the neighborhood level. Further, due to the disruption of social networks, the organization developed an online approach to col-

laborative marketing and local economic development. Launched in August 2006—on the first anniversary of the disaster—the Stay Local! program provides a venue for communication about neighborhood business recovery, the importance of spending at local businesses, and a visual mapping of the recovery process from the perspective of neighborhood businesses. This approach combined the need for marketing to returning residents with an outreach strategy to attract visitors to local commercial corridors.

Stay Local! also developed a print version of the neighborhood maps that displayed the locations of local businesses as well as historic and cultural attractions. These maps raised awareness of open businesses, provided a forum for organizing local firms, and displayed the heritage resources of the neighborhood. The first neighborhood map was developed for Mid-City—an area selected in the earlier studio work as a high-priority heritage tourism area. Following the success of this initial map, the Stay Local! program has continued to grow to more than 1,400 businesses and neighborhood guides have been produced for several commercial corridors across the city, including the Vietnamese business district in New Orleans East, Freret Street, Old Algiers, and Carrollton/Oak Street (Stay Local!, 2008).

The Stay Local! program has enabled the team to reach out to local businesses across the city, develop new partnerships, and develop a working relationship with community leaders. By providing a real deliverable that visualizes a citywide economic network of locally owned businesses, the organization has been able to build awareness of its mission.

Business Recovery Workshop: Stabilize, Sustain, and Grow

Following the launch of Stay Local! and the neighborhood map guide project, the local partner and the university shifted their attention to planning for a business recovery workshop. Recognizing the need for a coordinated effort to organize local businesses, the team held a 2-day workshop in January 2007 to provide a venue for sharing information, strategizing, and developing new methods of problem solving. This workshop involved presentations by a hazards planning specialist and a representative from the Institute for Business and Home Safety as well as a mobile tour of three neighborhood commercial districts (Oak Street, Mid-City, and Bayou Road). The findings are available at The Urban Conservancy's website (Wagner and Eness, 2007).

University Collaboration With Local Communities

The hallmark of the university-community partnerships model is a collaborative approach in which citizens and community organizations are engaged with faculty and students as part of an ongoing process of action research (Prins, 2005). While UMKC faculty remained engaged with The Urban Conservancy as a primary partner, it also developed other relationships with MCNO and FOLC. This section describes these partnerships and the results that have been achieved.

Recovery Planning in Mid-City

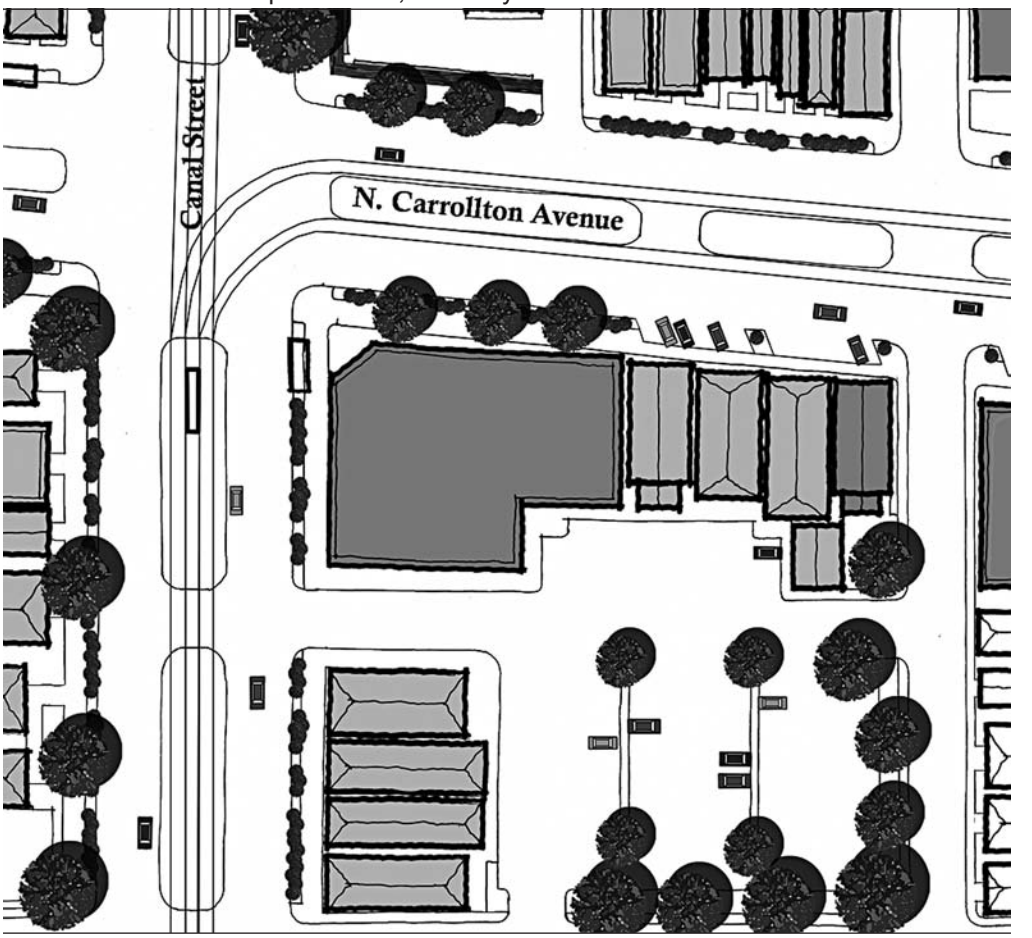
Given the uncertainty about recovery and the contested planning processes, citizens throughout New Orleans' neighborhoods mobilized to produce their own plans (Fields, 2006; Wagner, 2006). Partnerships between these neighborhoods and university planners often fostered an advocacy planning approach informed by a pluralism and multiplicity of competing plans (Davidoff, 1965).

One such neighborhood organization that developed a recovery plan was MCNO, which experienced substantial flood damage.

During the urban planning studio, the team identified MCNO as an additional partner open to working with students and faculty on a recovery plan focused around heritage tourism. Prestorm conditions in Mid-City made this strategy a good fit for the area—especially the reestablishment of the Canal streetcar, which provided a direct connection with the French Quarter and influenced the development of a cluster of new restaurants around existing culinary landmarks. The team recognized these conditions and several large sites for redevelopment as an opportunity to reestablish a commercial district at the scale of New Orleans urbanism. Given the substantial public investment in the Canal Streetcar line, the team advocated for an approach that would build on the transit-oriented development opportunities of the streetcar to replace the automobile-oriented development on North Carrollton Avenue in Mid-City (exhibit 2).

Exhibit 2

Plan View of Redevelopment Site, Mid-City



Student Site Plan, corner of North Carrollton Avenue and Canal Street in Mid-City Plan, depicts the transformation of a vacant, automobile-oriented commercial development into a pedestrian-oriented, mixed-use development to build on the substantial public investment in the Canal Streetcar in Mid-City.

A heritage tourism plan for Mid-City was published in June 2006. It provides MCNO with a strategy for tourism development in the neighborhood (Wagner et al., 2006). Following the completion of this document, university faculty continued to provide technical support to MCNO over the course of 2006 and 2007. This support included a peer review of the *New Orleans Neighborhoods Rebuilding Plan* for Planning District 4, survey design and analysis for a large retail development proposed in the neighborhood, and planning for the Lafitte Greenway.

Implementing Sustainable Urbanism: The Lafitte Greenway

One of the most successful outcomes facilitated through the partnership has been the institutionalization of a vision for neighborhood revitalization centered on the Lafitte Greenway. The basic concept of the Lafitte Greenway is to build a new public amenity in the form of a 3-mile, linear open space centered on a multiuse trail along the old rail and canal right-of-way known as the Lafitte Corridor. This new amenity would replace the abandoned space that formed a barrier through the heart of Mid-City. According to the work of Alan Berger (2006), this type of space could be viewed as a *drosscape,* a waste landscape created as a byproduct of political economic processes. The Lafitte Corridor was created by multiple phases of industrial capitalism related to port and rail modes of transit and proximity of location to the city's downtown core (both the French Quarter and the central business district). Earlier versions of this concept can be found in multiple city plans, including the 1999 New Orleans Land Use Plan (New Orleans City Planning Commission, 1999), the 2002 New Century New Orleans Master Plan (New Orleans City Planning Commission, 2002), and the Action Plan for New Orleans (BNOB Commission, 2006).

The purpose of creating a new public space in this corridor is to create a strategy for sustainable neighborhood revitalization. The strategy of trail-oriented development seeks to combine the nonmotorized transportation benefits of a trail with the revitalization potential of well-designed and managed urban parks to create a more livable city (Fields, 2006). The benefits of the greenway include enhancing the transportation options of low-income residents in adjacent neighborhoods, increasing safe access to public recreation and schools, developing a new framework for heritage tourism, and revitalizing local business. Trail-oriented development seeks to combine the amenity value of mixed-use development and the increased property value associated with well-designed open spaces and trails to create economically and environmentally sustainable neighborhoods (Crompton, 2001).

In New Orleans, the Lafitte Greenway proposal (exhibit 3) attracted a core group of area residents committed to sustainable recovery principles. Following the public presentation of the studio project in May 2006, local neighborhood advocates began to coalesce around the development of the greenway. The momentum produced by this process of collaboration helped institutionalize the greenway vision in the numerous planning processes. By the spring of 2006, local advocates were successful in getting the project listed as part of the New Orleans Neighborhoods Rebuilding Plan. During the summer of 2006, as the Unified New Orleans Plan was getting under way, a newly formed advocacy group, FOLC, was able to place the greenway development as a central element of the District Four plan.

The collaborative approach of the university faculty with local planners, guided by the passion of local leaders and citizen planners, has provided a platform for successful institutionalization of the

Exhibit 3

Lafitte Greenway Proposal: Trail Generator's Map

Student analysis of the large land use and activity centers that can generate use of the Lafitte Greenway in Mid-City and Tremé.

greenway project. University faculty and professional partners provided technical assistance, such as GIS mapping, demographic analysis, and grant writing, to support FOLC. Student work from the studio provided visual materials and maps that were adapted for outreach and advocacy efforts for both print and web-based publications (see http://www.folc-nola.org/). The success of this strategy has been carried through various stages of the project—including advocacy to ensure that the Lafitte Greenway would be included in each recovery plan. The partnership and FOLC made several grant applications totaling more than $400,000 in additional funding for planning, design development, or construction.[2]

The initial success at acquiring grant funds helped leverage additional momentum and resources for the project. In March 2007, Mayor Nagin, Dr. Ed Blakely, and the Office of Recovery Management announced that the Lafitte Greenway at Broad Street in Tremé was designated as one of 17 high-priority recovery areas (*The Times-Picayune*, 2007). This designation provided additional momentum as the team continued to develop a master plan for the greenway. In early 2007, the team received a $10,000 grant from the Bikes Belong Coalition to complete a master plan document that would lead to implementation.

The local leadership of citizens and professionals with the support of university planners and national advocacy organizations was critical in the process of moving this project along at a rapid pace. The team has worked directly with the staff of the Office of Recovery Management and the City Council to develop legislation to implement the project. In August 2007, the team achieved a major milestone with the adoption of legislation by the City Council of New Orleans that provides a structure for implementation. Following a presentation by FOLC and Dr. Wagner, the City Council voted unanimously to approve an ordinance establishing the greenway and a task force to

[2] Dedicated funds include a planning grant from Bikes Belong and funds for design development, engineering, and construction from Transportation Enhancements and the Recreation and Trails program.

implement the design and construction of the trail. In January 2008, the team published a vision plan to set the stage for greenway development (FOLC and Brown+Danos, 2007).

Evaluation: Thoughts on Rebuilding Local Capacity

Partnerships require a sharing of resources and an exchange of knowledge (Gilderbloom and Mullins, 2005). Through this partnership, the university trained students in disaster recovery planning, historic preservation, and neighborhood planning. Students gained experience working on local planning issues of national importance. After the project, the faculty continued to work with The Urban Conservancy to implement several projects identified in the students' work and to raise additional funds for implementation.

The community also gained in this partnership. Transition funding enabled The Urban Conservancy to retool and rebuild organizational capacity in the postdisaster environment. The organization hired a full-time director and successfully refocused its work within the context of disaster recovery and reconstruction. University investigators, the Rails-to-Trails partner, and The Urban Conservancy all assisted in developing a new advocacy group, FOLC, and raised grants, completed a vision plan, and worked to implement the Lafitte Greenway.

The work of the partnership helped institutionalize the community-based projects into the citywide, official planning processes. The partnership provided technical assistance to the Mid-City Neighborhood Organization. This assistance has come from The Urban Conservancy and the university faculty. Dana Eness of The Urban Conservancy and Dr. Wagner assisted in the successful application of two of the designated Urban Main Street projects that support local business districts. The Urban Conservancy continues it local business promotion strategy that builds on the heritage tourism model. Through the success of the Stay Local! program, The Urban Conservancy has been recognized as a valuable contributor to the city's economic recovery and was recognized by *CityBusiness* as "Innovator of the Year" in 2007.

In some ways, the real test of the partnership is how well plans get implemented (Knudsen, 1988). Relationships between UMKC, The Urban Conservancy, FOLC, and other partners have led to raising funds for plan implementation. New Orleans is a resource-starved city. Our success in garnering funds for implementation speaks to our desire to implement recovery and improvement of the city. This vision came about because of a commitment by the university faculty, The Urban Conservancy, and other partners to move beyond making plans to implementing plans and doing so in an engaged manner.

Several university and professional partners had planning experience in New Orleans before Hurricane Katrina, which gave them credibility on the ground during contentious and competing planning processes. Other university investigators built on their own relationships with individuals and groups in the city, which led to the development of trust. By providing support and assistance to more than one local organization, the partnership increased the probability of plan implementation. The plan's ideas and projects have become part of the priorities of multiple parties in the contentious planning environment of post-Hurricane Katrina New Orleans.

Conclusion: Lessons Learned for University-Community Partnerships

Disasters require the ability to invent appropriate responses and then follow through with additional collaboration, problem solving, and outreach. History matters—the disaster did not create a "clean slate" (Wagner 2008). Requiring the students to read predisaster plans, such as the *New Orleans Land Use Plan* and neighborhood plans, was critical. Without knowledge of predisaster conditions, teams are likely to fail in their efforts. Successful partnerships in a city like New Orleans require local knowledge, respect for local culture, and an understanding of the city's recent political history.

Relationship building and capacity building are critical (Glickman and Servon, 1998). UMKC's approach has been to encourage the local residents to lead while the university provides technical and professional support. As the planning theory literature suggests, trust is critical, especially in the context of distrust created by the failed response to the disaster (Kumar and Paddison, 2000). Commitment, flexibility, and persistence—sticking with it and going beyond a predetermined scope of work—help to sustain trust and foster new partnerships. The university is not alone in setting the direction of the partnership or the content of the planning work. Instead, the direction and focus are informed by shared decisionmaking, and the professional team organized by the university acts as a technical and political advisor to the citizen-based groups.

This work has shown that university-community partnerships can be especially helpful in a disaster-recovery environment. The partnership has led to increased local capacity to support local businesses, advocate for neighborhoods, and transform unused land into an urban amenity for neighborhood revitalization. The agenda must come from local consultation and must reflect and react to the history of local planning practice in the neighborhoods and communities where the partnership is working. Partnerships need to build in the flexibility to work with multiple organizations or to create new organizations when necessary. Although the Urban Conservancy directly benefited, it also served as a community planning and recovery intermediary by providing support and services directly to individual businesses, neighborhood groups, and new nonprofit organizations (Frisch and Servon, 2006).

Positive and negative aspects exist when a nonlocal university provides support. One negative is that university faculty are removed from the harsh, everyday realities of disaster recovery. Frequent trips to the city were necessary to maintain faculty awareness and attention to the changing politics of a city in the recovery and reconstruction phases. Yet, the distance gives the university faculty the advantage of leveraging nonlocal resources and capacity that are not overwhelmed by the disaster. Local universities, planning and design experts, and nonprofit organizations in New Orleans were engaged in their own personal recovery from the disaster while assisting the broader planning and reconstruction processes. In this context, a partnership informed by mutual respect and dedication with a goal of local capacity building was a useful approach to the university-community partnership model.

Acknowledgments

The authors thank Dana Eness, Geoff Coats, Ben Gauslin, and Ed Melendez of The Urban Conservancy; Joe Hughey and Joy Swallow of the University of Missouri-Kansas City; Jane Brooks, Isabel Maret, and Maria Nelson of The University of New Orleans; Daniel Samuels, Bart Everson, and Janet Ward-Pease of the Friends of Lafitte Corridor; Wendy Laker and Jennifer Weishaupt of the Mid-City Neighborhood Organization; and Jennifer Ruley of the Louisiana Public Health Institute.

Authors

Jacob Wagner is an assistant professor of urban planning and design at the University of Missouri-Kansas City.

Michael Frisch is an assistant professor of urban planning and design at the University of Missouri-Kansas City.

Billy Fields is the director of the Center for Urban and Public Affairs at The University of New Orleans.

References

Alesch, Daniel, James Holly, Elliott Mittler, and Robert Nagy. 2001. "Organizations at Risk: What Happens When Small Businesses and Not-for-Profits Encounter Natural Disasters." Small Organizations Natural Hazards Project, First-Year Technical Report. Green Bay, WI: University of Wisconsin-Green Bay.

American Planning Association. 2005. *Charting the Course for Rebuilding a Great American City: An Assessment of the Planning Function in Post-Katrina New Orleans.* Report prepared for the New Orleans City Commission and the Louisiana Chapter of the American Planning Association.

Baum, Howell. 2003. *Community Action for School Reform.* Albany: SUNY Press.

Berger, Alan. 2006. *Drosscape.* New York: Princeton Architectural Press.

Blake, Sheri. 2003. "Community Design Centers: An Alternative Practice." In *Time-Saver Standards for Urban Design* by Donald Watson, Alan Plattus, and Robert Shibley. New York: McGraw-Hill, 4.11: 1–5.

Bring New Orleans Back (BNOB) Commission. 2006. *Action Plan for New Orleans: The New American City*. New Orleans: Bring New Orleans Back Commission.

Brooks, Jane, and Fritz Wagner. 1999. *On the Waterfront: A Plan To Revitalize Bywater and the St. Claude Corridor*. New Orleans: The University of New Orleans, College of Urban and Public Affairs.

Burke, Philip, and Timothy Beatley. 1997. *After the Hurricane: Linking Recovery to Sustainable Development in the Caribbean*. Baltimore: Johns Hopkins University Press.

Crompton, John. 2001. "The Impact of Parks on Property Values: A Review of the Empirical Evidence," *Journal of Leisure Research* 33 (1): 1–31.

Davidoff, Paul. 1965. "Advocacy and Pluralism in Planning," *Journal of the American Institute of Planners* 31 (4): 331–38.

Deyle, Robert et al. 1998. *Planning for Post-Disaster Recovery and Reconstruction,* Planning Advisory Service Report 483/484. Chicago, IL: American Planning Association.

Drabek, Thomas. 1986. *Human System Response to Disaster: An Inventory of Sociological Findings*. New York: Springer-Verlag.

Dufour, Wendel, and David Gladstone. 2004. *Upper Ninth Ward Community Plan*. Sponsored by St. Mary of the Angels, Mt. Moriah Missionary Baptist Church, and All Congregations Together. The University of New Orleans, College of Urban and Public Affairs.

Eggler, Bruce. 2005. "City Planners Want Role in Rebuilding," *The Times-Picayune,* October 29: B3.

Feld, Marcia Marker. 1997. "One Invention—HUD's Office of University Partnerships—and One Pervasive Problem," *Journal of Planning Literature* 11 (3): 323–326.

Fields, Billy. 2006. *Trail-Oriented Development: Exploring an Emerging Concept in Post-Katrina New Orleans.* Washington, DC: Rails-to-Trails Conservancy.

Foley, John, and Mickey Lauria. 2003. "Historic Preservation in New Orleans' French Quarter: Tolerance and Unresolved Racial Tensions." In *Knights and Castles: Minorities and Urban Regeneration,* edited by Fracesco Lo Piccolo and Huw Thomas. Aldersgate, UK: Ashgate: 67–89.

Friends of Lafitte Corridor (FOLC) and Brown+Danos landdesign, inc. 2007. *Lafitte Greenway Master Plan: New Orleans, Louisiana.* Plan prepared for the Friends of Lafitte Corridor: New Orleans. http://www.folc-nola.org/ (accessed October 3, 2008).

Frisch, Michael, and Lisa Servon. 2006. "CDCs and the Changing Context for Urban Community Development: A Review of the Field and the Environment," *Community Development* 37 (4): 88–108.

Gilderbloom, John, and Robert Lee Mullins. 2005. *Promise and Betrayal: Universities and the Battle for Sustainable Urban Neighborhoods.* Albany: SUNY Press.

Glickman, Norman, and Lisa Servon. 1998. "More Than Bricks and Sticks: Five Components of Community Development Capacity," *Housing Policy Debate* 9 (3): 497–539.

Haas, J. Eugene, Robert W. Kates, and Martyn J. Bowden, eds. 1977. *Reconstruction Following Disaster*. Cambridge, MA: MIT Press.

Hayden, Dolores. 1995. *The Power of Place: Urban Landscapes as Public History*. Cambridge, MA: MIT Press.

Hester, Randolph. 2006. *Design for Ecological Democracy*. Cambridge, MA: MIT Press.

Hester, Randolph. 1984. *Planning Neighborhood Space with People*. New York: Van Nostrand Reinhold.

Hirsch, Arnold, and Joseph Logsdon, eds. 1992. *Creole New Orleans: Race and Americanization*. Baton Rouge, LA: Louisiana State University Press.

Judd, Dennis R., and Susan S. Fainstein, eds. 1999. *The Tourist City*. New Haven, CT: Yale University Press.

Knudsen, Tim. 1988. "Success in Planning," *International Journal of Urban and Regional Research* 12 (4): 550–563.

Kumar, Ashok, and Ronan Paddison. 2000. "Trust and Collaborative Planning: The Case of the Scottish Planning System," *International Planning Studies* 5 (2): 205–223.

Laska, Shirley, and Betty Hearn Morrow. 2006. "Social Vulnerabilities and Hurricane Katrina: An Unnatural Disaster in New Orleans," *Marine Technology Society Journal* 40 (4):16–26.

Lauria, Mickey, Wendel Dufour, Patrick Haughey, and J. Lamarque. 1996. *Citizen Planning for Community Development in the Lower Ninth Ward.* New Orleans: College of Urban and Public Affairs, Division of Urban Research and Policy Studies.

Louisiana Department of Culture, Recreation and Tourism. 2005a (September). *New Orleans, Louisiana Rebirth: Restoring the Soul of America*. Baton Rouge: State of Louisiana.

Louisiana Department of Culture, Recreation and Tourism. 2005b. *Tourism and Cultural Industry Housing*. Baton Rouge: State of Louisiana.

Lynch, Kevin. 1972. *What Time Is This Place?* Cambridge, MA: MIT Press.

Melendez, Ed, and Geoff Coats. 2004. "Expanding the Frames: A Response to 'Framing the Urban'," *City and Community* 3 (4): 395–397.

Nelson, Marla, Renia Ehrenfeucht, and Shirley Laska. 2007. "Planning, Plans, and People: Professional Expertise, Local Knowledge, and Government Action in Post-Hurricane Katrina New Orleans," *Cityscape* 9 (3): 23–52.

New Orleans City Planning Commission. 2002. *New Century New Orleans Master Plan: Parks, Recreation and Open Space.* New Orleans: The city of New Orleans.

New Orleans City Planning Commission. 1999. *New Orleans Land Use Plan.* New Orleans: The city of New Orleans.

Pearson, Jason. 2002. *University-Community Design Partnerships: Innovations in Practice*. New York: Princeton Architectural Press.

Piazza, Tom. 2005. *Why New Orleans Matters.* New York: Harper.

Prins, Esther. 2005. "Framing a Conflict in a Community-University Partnership," *Journal of Planning Education and Research* 25: 57–74.

Russell, Gordon, and Frank Donze. 2006. "Officials Tiptoe Around Footprint Issue," *The Times-Picayune,* January 8.

Stay Local! 2008. Stay Local website. http://www.staylocal.org/biz/guides/ (accessed October 3, 2008).

Terrell, Dek, and Ryan Bilbo. 2007. *A Report on the Impact of Hurricanes Katrina and Rita on Louisiana Businesses: 2005Q2-2006Q4*. Baton Rouge, LA: Louisiana State University, E.J. Ourso College of Business, Division of Economic Development.

The Times-Picayune. 2007. "City Announces First 17 Target Recovery Zones," March 29. http://blog.nola.com/updates/2007/03/city_announces_first_17_target.html (accessed October 3, 2008).

The Urban Conservancy. The Urban Conservancy website. http://www.urbanconservancy.org/ (accessed October 3, 2008).

Urban Land Institute. 2005. *Executive Summary of Key Recommendations—A Strategy for Rebuilding New Orleans, Louisiana, November 12–18, 2005*. Washington, DC: Urban Land Institute.

U.S. Department of Housing and Urban Development (HUD). 2006. *Current Housing Unit Damage Estimates*. U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

Vale, Larry J., and Thomas J. Campanella. 2005. "Conclusion, Axioms of Resilience." In *The Resilient City*, edited by Larry J. Vale and Thomas J. Campanella. New York: Oxford University Press, 335–356.

Vesey, Catherine. 1997. *Tourism as Community Development*. Research paper. New Orleans: The University of New Orleans, College of Urban and Public Affairs.

Wagner, Jacob. 2008. "Understanding New Orleans: Creole Urbanism." In *What is a City? Rethinking the Urban After Hurricane Katrina*, edited by Phil Steinberg and Rob Shields. Athens, GA and London: University of Georgia Press, 172–185.

Wagner, Jacob. 2006. "The Privatization of Urban Planning and Public Space in New Orleans in the Wake of Hurricane Katrina." Paper presented at the Associated Collegiate Schools of Planning annual meeting.

Wagner, Jacob, and Dana Eness. 2007. "Stay Local Business Summit Report." http://www.staylocal.org/info/pdf/Business-Summit-Report-Jan07.pdf (accessed October 3, 2008).

Wagner, Jacob, Michael Frisch, Vincent Gauthier, Vanessa Spartan, Jawairia Sial, and Renata Alomari. 2006. *Heritage Tourism in Mid-City*. Kansas City: University of Missouri-Kansas City. http://www.urbanconservancy.org/projects/heritage-tourism-in-midcity (accessed October 3, 2008).

Whelan, Robert K. 2006. "An Old Economy for the "New" New Orleans? Post-Hurricane Katrina Economic Development Efforts." In *There Is No Such Thing as a Natural Disaster: Race, Class, and Hurricane Katrina*, edited by Chester Hartman and Gregory D. Squires. New York: Routledge.

Equity Planning in Post-Hurricane Katrina New Orleans: Lessons From the Ninth Ward

Kenneth M. Reardon
The University of Memphis

Marcel Ionescu-Heroiu
The World Bank

Andrew J. Rumbach
Cornell University

Abstract

This article describes how grassroots activists and community leaders representing poor and working class residents of New Orleans, together with planning students and faculty from three research universities, overcame racial, class, and cultural barriers to collaboration to create and promote a comprehensive Hurricane Katrina recovery plan for the neighborhoods that make up the city's Ninth Ward.

Introduction

During the past 25 years, there has been a growing acceptance of Ernest Boyer's notion of the scholarship of engagement within American higher education (Boyer, 1994). Today, more than 1,100 college and university presidents are members of Campus Compact, a national organization committed to mobilizing the assets of campuses to assist local residents, officials, and institutions struggling to improve conditions in economically challenged rural and urban communities.[1] Each year, millions of university students enroll in service-learning courses encountering what Jack Mezirow referred to as transformational learning experiences, while working with long-term community activists and leaders pursuing social justice through various organizing, advocacy, and service initiatives (see Mezirow, 1991).

[1] For more information regarding the goals, programs, memberships, and accomplishments of the Campus Compact, visit the organization's website at http://www.compact.org.

In October 2005, in response to the aftermath of Hurricane Katrina, leaders from the Association of Community Organizations for Reform Now (ACORN) contacted planners and designers from Pratt Institute and Cornell University for technical assistance. These grassroots leaders representing the eastside neighborhoods of New Orleans challenged these academic planners to help them establish partnerships between social justice-oriented faculty from planning and design schools and ACORN chapters representing several New Orleans neighborhoods. At the time, these neighborhoods were being described as too damaged and "at risk" for future storm damage to merit public and private reinvestment. These leaders advocated the "right to return" for residents of all neighborhoods where reasonable stormwater management practices and building code enforcement could ensure residents' safety.[2] ACORN activists questioned the accuracy of many of the initial damage and risk assessment reports that had prompted policy analysts to propose various forms of planned shrinkage.[3] Under these proposals, areas perceived to have experienced the greatest damage and to be at maximum risk for future flooding would be abandoned and transformed into permanent urban wetlands and wilderness areas in light of what the Brookings Institution estimated to be a likely 50-percent loss in population.

ACORN leaders viewed many of the early damage assessments and projections, which were being used to support policies that would concentrate recovery spending within the city's Central Business District and in areas that had suffered the least amount of storm damage, with great skepticism. Desperate to ensure a careful assessment of post-Hurricane Katrina physical conditions, detailed estimates of building and infrastructure rehabilitation costs, and a systematic survey of displaced families' redevelopment preferences for their eastside neighborhoods, these leaders sought to establish partnerships with willing members of the planning and design academy. Although committed to establishing such partnerships, neither these community leaders nor their university collaborators fully appreciated the challenges they would have to overcome to create a trusting and productive collaboration.[4] This context is described more fully in the section titled Contextual Challenges to Planning.

The case study presented in this article describes the experiences of one set of academic planners and designers who participated in this process as recorded by two graduate planning students and one faculty member who helped organize a collaborative team. This unique planning partnership was established in July 2006 to help Ninth Ward residents prepare a comprehensive recovery plan for the 10 historic neighborhoods that make up this area, and the partnership continues to provide technical assistance to residents committed to implementing *The People's Plan for Overcoming the Hurricane Katrina Blues: A Comprehensive Strategy for Promoting a More Vibrant, Sustainable, and Equitable 9th Ward*.

[2] The "right to return" was the first element in the ACORN Katrina Survivors Association recovery platform. For more information, visit the ACORN website at www.acorn.org/index.php?id=10284.

[3] *Planned shrinkage* or *urban triage* are terms made popular by the late Roger Starr, a former New York City housing commissioner and *New York Times* Editorial Board member, which recommended the systematic removal of services from severely distressed neighborhoods in cities confronting serious economic losses and out-migration (Starr, 1976).

[4] See Ferguson and Stoutland (1999) for a discussion of the challenges of establishing trust within ongoing community development initiatives.

An Overview of the Literature and the Theoretical Framework

The team's New Orleans work was informed by previous scholarship in five distinct areas of inquiry. Among these were the ecological and social history of New Orleans, disaster planning, community development, advocacy and equity planning, and the community-university partnership literature. Team members prepared themselves for work in New Orleans by reviewing texts exploring the previously mentioned topics during a hastily organized 2-credit reading course, which Cornell students and faculty worked together to create during the 2006 fall semester.

Ecological History

The team began investigating the region's ecological history by reading Ari Kelman's *A River and Its City: The Nature of Landscape in New Orleans* and Peirce F. Lewis's *New Orleans: The Making of an Urban Landscape,* which chronicle the historical origins of New Orleans and efforts to control its seasonal flooding (Kelman, 2003; Lewis, 2003). Team members also read John Barry's extraordinary volume, *Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America,* which describes the conflict between military- and civilian-trained engineers regarding the adequacy of a levees-only approach to stormwater management in the days preceded by the flood of 1927 (Barry, 1998). In addition, they read John McPhee's wonderfully crafted essay on the Atchafalaya in his volume, *The Control of Nature,* which records the failure of recent stormwater control strategies undertaken by the U.S. Army Corps of Engineers (McPhee, 1989). In addition to reading these classic texts, the team read a series of more recent works that described the factors that contributed to the catastrophic levee system failure and breakdown of local, state, regional, and national rescue, relief, and recovery efforts following Hurricanes Katrina and Rita. These works included Jed Horne's *Breach of Faith: Hurricane Katrina and the Near Death of a Great American City* and John McQuade and Mark Schleifstein's *Path of Destruction: The Destruction of New Orleans and the Coming Age of Superstorms* (Horne, 2006; McQuade and Schleifstein, 2006).

Social History

Seeking to gain insights into the city's rich social, cultural, and political history, the team studied Richard Campanella's *Geographies of New Orleans: Urban Fabric Before the Storm,* Harry Williams' *Huey Long,* and Abbott Joseph Liebling's *The Earl of Louisiana,* among other volumes (Campanella, 2006; Liebling, 1970; Williams, 1969).

Disaster Planning

Reading Lawrence Vale and Thomas Campanella's *The Resilient City: How Modern Cities Recover from Disaster;* Jon William Toigo's *Disaster Recovery Planning: Preparing for the Unthinkable;* and the article by Raymond Burby, et al., "Creating Hazard Resilient Communities Through Land-Use Planning," team members gained a deeper understanding of the staying power of most urban settlements and what can be done to make cities more disaster resistant (Burby, et al., 2000; Toigo, 2002; Vale and Campanella, 2005).

Community Development

Team members were introduced to the fundamentals of community-based planning by reading William Peterman's *Neighborhood Planning and Community-Based Planning: The Potential and Limits of Grassroots Action* and Herbert Rubin's *Renewing Hope within Communities of Despair: The Community-Based Development Model* (Peterman, 2000; Rubin, 2000).

Advocacy and Equity Planning

Realizing the need to help residents gain voice within the city's often contentious recovery planning process, team members reviewed Paul Davidoff's classic article, "Planning and American Pluralism"; Norman Krumholz's *Making Equity Planning Work: Leadership in the Public Sector;* and Marie Kennedy, Chris Tilly, and Mauricio Gaston's "Transformative Populism and the Development of a Community of Color" (Davidoff, 1965; Kennedy, Tilly, and Gaston, 1991; Krumholz, 1990).

Community-University Development Partnerships

Finally, team members also studied Henry Cisneros's booklet, *The University and the Urban Challenge*, which invites university faculty to involve their students in critical problem-solving and development efforts in economically challenged communities (Cisneros, 1996). The team also studied Richard Schramm and Nancy Nye's *Building Higher Education-Community Development Corporation Partnerships,* which is one of the first systematic evaluations of the community-university partnership movement that raises critical questions regarding the potential limits of town-gown development collaboratives (Schramm and Nye, 1999).

The Project's Theoretical Framework

A careful review of these scholarly works gave light to some of the challenges the team might confront in assisting resident-led planning efforts. The model of grassroots planning and development that emerged sought to integrate the core theories, methods, and practices of participatory action research, direct-action organizing, and popular education into a holistic approach to community change. The ultimate goal of the approach was to enhance the capacity of poor peoples' organizations to influence the public and private investment decisions that determine quality of life.

Contextual Challenges to Planning

In general, faculty on the team found scarce economic resources, concentrated political power, and considerable social distance between residents seeking change and their outside supporters. Many planning experts viewed environmental conditions in post-Hurricane Katrina New Orleans as being hazardous to human health. The travel and lodging costs made engagement in Gulf Coast recovery efforts expensive. The evacuation of residents challenged those committed to participatory approaches to planning and design. Finally, the contentious nature of local government politics and the often poorly organized federal relief effort raised questions regarding the usefulness of community-university recovery planning partnerships. Notwithstanding these and other challenges, a small number of academic planning and design departments stepped forward to work with ACORN to produce comprehensive recovery plans for several of the city's most severely damaged

neighborhoods. Most of those universities that involved their students in these collaborative efforts were influenced by the advocacy planning ideas of Paul Davidoff, who believed that planning outcomes for the poor could be improved when planners helped poor people's organizations create their own independent plans (see Davidoff, 1965).

Organizing for Action

Several weeks after Hurricanes Katrina and Rita, Steven Kest, ACORN's national staff director, called the Cornell University Department of City and Regional Planning (CRP) to request CRP's help in mobilizing planning and design students and faculty to assist resident-led recovery efforts in New Orleans. ACORN's main local concerns were concentrated in the city's eastside neighborhoods, where more than 9,000 ACORN members lived. In response, CRP's chair, Kenneth Reardon, met with Kest to learn more about the immediate research, planning, and development needs of those neighborhoods. Reardon then communicated the needs to CRP's students and faculty, which resulted in significant student-led efforts to obtain departmental funds to launch the New Orleans Planning Initiative. With $100,000, 36 students and 4 faculty members worked together to design a 2-credit course that provided potential New Orleans volunteers with a basic orientation to the city (Gustafson, 2005).

During this academic course, graduate students organized a campaign that generated $22,000 to send 19 students and faculty to New Orleans to help eastside residents gut their homes in preparation for rehabilitating these structures. Working alongside local residents, Cornell students and faculty built relationships with those residents leading the recovery efforts, enabling them to acquire a clearer understanding of the community's highest priority planning and design needs. Simultaneously, CRP faculty organized a special roundtable session to examine the recovery planning needs of New Orleans for the 2005 Annual Meeting of the Association of Collegiate Schools of Planning (ACSP) scheduled to take place in Kansas City, Kansas, in late October. At this meeting, Richard Hayes, ACORN Housing Corporation's director of special projects, suggested that those faculty members who met with him at the ACSP annual meeting convene with ACORN the following month to cosponsor a Rebuild New Orleans Policy Conference in Baton Rouge. At this policy conference, the 52 planning and design scholars in attendance presented a list of 36 research, planning, and design projects they were prepared to undertake.

Within weeks, Pratt Institute and the New Jersey Institute of Technology (NJIT) faculty were working with ACORN's New Orleans East Chapter, the University of New Orleans and Tulane University were supporting recovery efforts in the Gentilly neighborhood, Harvard's Graduate School of Design was assisting the Broadmoor community, and Louisiana State University's (LSU's) School of Architecture and Cornell University's Department of City and Regional Planning (CRP) were working on projects identified by Ninth Ward leaders.

Earning a License To Operate as "Good Partners"

From their work with Ninth Ward leaders during the winter of 2005–06, Cornell University students and faculty developed a list of short-term research and technical assistance needs. CRP subsequently attempted to address these needs by creating five specially designed studio courses

focused on the preservation of a public market, investigation of alternative stormwater management systems, reintegration of the Ninth Ward's street system, efficient organization of the area's relief and recovery workforce, and expansion of affordable housing within the community.

More than 80 students from these classes worked together during the spring of 2006 to prepare preliminary project displays, which they brought to New Orleans March 25–26, 2006, to share with interested residents and elected officials from the Ninth Ward. Anticipating 40 to 60 participants to attend a half-day charrette (collaborative design session), the students, faculty, and community partners were delighted when more than 150 individuals showed up to review the students' work. The residents' enthusiastic response to the students' display boards and their spirited critiques encouraged the students to produce a series of inspired final projects. The Ninth Ward residents and leaders' positive response to the projects prompted ACORN to propose a jointly funded summer internship program that enabled 10 of the most talented students to continue working on their Ninth Ward projects.

Recovery Summer

Among the projects the summer interns completed was an analysis of 3,000 tax-adjudicated (delinquent) properties that Orleans Parish wished to give to area developers and nonprofit organizations. The interns also completed a survey of alternative tax assessment techniques appropriate for use in weak markets. Finally, the students produced a booklet titled, *A Guide to Participatory Neighborhood Planning in New Orleans,* in anticipation of the city's plan to produce a comprehensive citywide recovery strategy.[5] As the students' internships were drawing to a close, ACORN asked them to prepare a formal proposal for comprehensive planning services in response to a city-issued Request for Qualifications (RFQ).

Realizing the breadth of the planning activities required by the RFQ, the students decided to invite faculty and students from several schools with complementary expertise to form a new community-university partnership, which they named the ACORN Housing/University Collaborative (the Collaborative).[6] They succeeded in recruiting Cornell, Columbia, Pratt, NJIT, and LSU faculty to participate in the Collaborative. Later, the Collaborative was chosen as 1 of 23 finalists from a pool of 69 private firms. As finalists, Collaborative representatives were invited to make a brief presentation before an expert panel assembled by the Rockefeller Foundation, the Greater New Orleans Support Foundation, and the Clinton/Bush Katrina Fund, which was charged with selecting the final list of 15 consultants to prepare the Unified New Orleans Plan (UNOP) (UNOP, 2006). The Collaborative's presentation stressed the unique combination of community organizing, neighborhood planning, civil engineering, affordable housing credentials, and the track record of the newly established network.

[5] See ACORN Housing Corporation, 2006. Students from Cornell University, Louisiana State University School of Architecture, New Jersey Institute of Technology, and Pratt Institute, in a combined effort, contributed to this booklet.

[6] The original name of the consortium was the ACORN Housing/University Partnership. When the Counsel's Office at Cornell University raised concerns regarding liability issues, the name was changed in May 2007 to ACORN Housing/University Collaborative.

Selection as UNOP Senior Consultants

Ten days after the presentation, the Collaborative was informed that it had also been designated as one of five organizations to serve as senior consultants within the UNOP comprehensive planning process. Shortly after being notified of the selection, the Collaborative team attended an all-day meeting to review UNOP's overall goals and objectives and the draft scope of services. Although the team members were very pleased to be selected to participate in what they believed to be one of this generation's most important planning projects, they had two serious concerns moving forward. First, UNOP required participating consultants, within 3 months, to collect and analyze a wide range of data for yet-to-be-assigned neighborhoods to prepare comprehensive infrastructure plans for these neighborhoods. This schedule was extraordinarily aggressive, given the data availability, research methodology, and citizen participation challenges the team expected to confront. Second, the UNOP scope of services, despite acknowledging the critical educational, employment, healthcare, municipal service, and public safety problems confronting the city's neighborhoods before Hurricanes Katrina and Rita occurred, did not require consultants to address these issues. Although painfully aware of the challenges related to producing a technically defensible infrastructure plan, the Collaborative team members were convinced that any plan that did not address the economic development and human capital challenges confronting the city's neighborhoods would be doomed to fail.

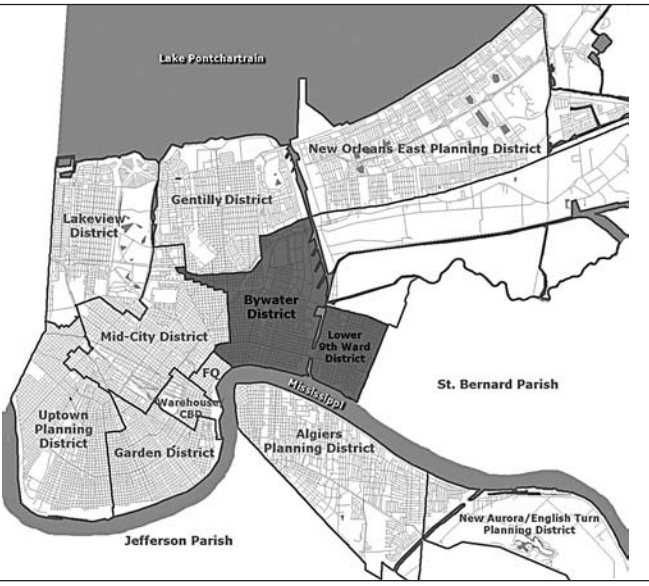
Several weeks after UNOP announced the initial list of neighborhood and senior planning consultants, each planning team presented its unique planning philosophies and community planning methods to representatives of the city's neighborhoods during a public meeting. Following this meeting, residents and elected officials from the city's seventh and eighth planning districts—an area of 10 neighborhoods known as the Ninth Ward (see exhibit 1)—overwhelmingly selected the Collaborative to be their consultants. Planners from Eckbo, Dean, Austin & Williams (EDAW) Atlanta Office and architects from John C. Williams Associates were selected to help the Collaborative prepare the comprehensive recovery plan for the nine unique neighborhoods comprising the Ninth Ward.[7] Upon receiving a confirmation of their appointment as the Ninth Ward's planning consultants from the Concordia Consulting Group, the private firm managing the UNOP process, Collaborative team members confirmed the participation of the various institutions that had earlier agreed to participate in the project. As the end of the summer approached, faculty from Pratt, NJIT, and LSU informed the Collaborative that they would be unavailable to participate in the Ninth Ward project because of their involvement in other New Orleans projects.

In August, faculty from Cornell, Columbia, and the University of Illinois at Urbana-Champaign met with representatives of ACORN in New Orleans to craft a detailed work plan designed to enable the team to (1) collect and analyze the historic and current physical conditions data needed to prepare the infrastructure plan required by UNOP's Draft Scope of Services and (2) assemble and analyze additional survey, interview, and focus group data from returning residents, institutional

[7] Members of the Collaborative were aware of the large number of highly skilled planners and designers with previous neighborhood planning experience who were attached to EDAW's Atlanta Office. They also knew about the Williams Group's prior experience overseeing the development of New Orleans' successful Riverwalk. The team believed the experience and expertise of these two outstanding firms would greatly contribute to its Ninth Ward recovery planning efforts.

Exhibit 1

UNOP-Designated Planning Districts



Source: Greater New Orleans Community Data Center (http://www.gnocdc.org/mapping/docs/Neighborhood.pdf)

leaders, and elected officials to address the Ninth Ward's broader economic and community development needs. By going beyond UNOP's Draft Scope of Services, the team sought to prepare a holistic recovery plan that would give balanced attention to the significant physical and social development needs of the Ninth Ward's individual neighborhoods, several of which were in serious trouble well before Hurricanes Katrina and Rita came ashore. The team's overall staffing plan assumed an experienced project planner would be hired to supervise the technical work of three recent graduates from the participating planning schools who would be stationed in New Orleans. The efforts of these individuals would be extended by the work of 45 to 60 students, who would undertake most of the field-based data collection, data entry, data scrubbing, preliminary data analysis, Geographic Information System (GIS) mapping, and report drafting activities under the supervision of participating faculty.

Gathering the Facts

Within days, this staffing plan had to be abandoned when more than a dozen experienced project planners contacted by the Collaborative indicated that they were already working on Gulf Coast-related planning and design projects. Confronting a shortage of seasoned practitioners with prior disaster planning experience, Richard Hayes of ACORN Housing Corporation and Ken Reardon of Cornell University agreed to co-manage the planning process with the assistance of two Cornell planning students who volunteered to set aside their studies to serve as full-time project staff. Six graduate research assistants from Cornell and Illinois universities assisted this small and dedicated staff. Returning to their respective campuses following this planning meeting, participating faculty recruited seven additional faculty willing to organize five workshops with students who would

form the backbone of the project team. By Labor Day, the faculty had enrolled more than 80 students in the following Collaborative courses scheduled for the fall of 2006:

- **Graduate Housing Studio,** *Department of Urban and Regional Planning, University of Illinois at Urbana-Champaign, Lisa K. Bates, Assistant Professor.* Twelve professional and doctoral students were recruited to complete detailed surveys of the Ninth Ward's housing market and business sector.
- **Post-Doctoral Research Seminar,** *Earth Institute, Columbia University, Rebekah Green, Post-Doctoral Research Fellow*. Four post-doctoral students in civil engineering and environmental science were assembled to develop sampling protocols and survey methods to determine the storm damage, structural integrity, and rehabilitation costs for the Ninth Ward's building stock.
- **Introduction to City Planning,** *Department of City and Regional Planning, Cornell University, Kenneth M. Reardon, Associate Professor.* Forty sophomores were enlisted to review historic plans for the Ninth Ward, survey buildings, interview residents, and research model revitalization programs.
- **Neighborhood Planning Workshop,** *Department of City and Regional Planning, Cornell University, Kenneth M. Reardon, Associate Professor; Richard C. Kiely, Visiting Lecturer; and Michelle M. Thompson, Visiting Lecturer.* Twenty-two students were mobilized to create survey instruments, interview schedules, and focus group protocols needed to prepare a comprehensive recovery plan.
- **Urban Design Studio,** *Department of City and Regional Planning, Cornell University, Jeremy Foster, Associate Professor.* Twelve students were recruited to prepare urban design policies to reconnect the isolated neighborhoods of the Ninth Ward.

Students enrolled in these courses successfully completed the following research activities required by the Collaborative's UNOP contract:

- Reviewing 29 historic plans describing physical, economic, and social conditions within the Ninth Ward.
- Analyzing Ninth Ward population and housing trends using U.S. Census data.
- Summarizing Ninth Ward physical conditions as described by city-managed GIS data.
- Distilling principles of good practice for postdisaster recovery planning available within the literature.
- Conducting an inventory of successful postdisaster recovery projects in the areas of infrastructure, education, health, safety, housing, and the arts.

As students completed their analyses of these data, participating faculty assembled the project team at the Levin School of Urban Affairs at Cleveland State University in mid-September 2006 to share their preliminary research results, review a revised work plan, and prepare for a major field-based data collection effort in New Orleans scheduled for late October. A week after this meeting, project team members traveled to New Orleans to share the highlights of their archival, physical conditions, and best practice research with 75 residents of the Ninth Ward.

Following the Collaborative's completion of the first UNOP deliverable, team members created survey instruments and sampling protocols to determine the structural integrity of the Ninth Ward's building stock, the percentage of families that had returned to restore their homes, and

residents' preferred redevelopment strategies. As plans were being finalized to bring 80 students to New Orleans for 5 days, the Collaborative received a fax from the Concordia Group, informing the team that it had been "realigned." According to this fax, an alleged conflict of interest involving the team's community partner had come to their attention related to the partner's supposed control of former tax-adjudicated properties in the Ninth Ward. According to the Concordia Group, the community partner's ownership of these properties placed them in the position of functioning as both planners and developers, in clear violation of the American Institute of Certified Planners' Code of Ethics. In light of this situation, the Concordia Group believed they had no choice but to realign the Collaborative.

Although shocked to receive this news just days before undertaking a major survey of existing physical conditions, business activities, and residents' preferences, the participating faculty were confident that this problem would be successfully resolved to enable the team to continue its work as part of the UNOP process. The faculty based their assessment on the following facts: (1) the community partner had not yet received title to any tax-adjudicated properties within the study area; (2) several high-profile UNOP consultants were actively engaged in development projects within the city, yet were not being charged with conflicts of interest; (3) the Collaborative had disclosed its affordable housing activities in its RFQ submission and presentation; (4) the team's initial outreach, data collection, data analysis, and report-writing efforts had received positive feedback from local residents and officials; and (5) the UNOP contract, if necessary, could be easily transferred to one or more of the universities responsible for the overwhelming bulk of the UNOP activities, thereby eliminating any perceived conflict of interest with the community partner. When efforts to resolve the alleged "conflict of interest" charge failed, members of the Collaborative faced a serious dilemma.

Members of the team questioned whether they as planners had an ethical responsibility to continue working if the quasi-public agency responsible for funding this effort on behalf of the city's long-suffering poor, working class, and middle-income residents refused to cover our expenses. The students responded with a resounding "YES," offering to help raise the estimated $50,000 needed to complete the plan. Over the course of the previous year, many of these students had spent a considerable amount of time getting to know the residents of the Ninth Ward and were unwilling to abandon those individuals, whose needs they believed local officials had long ignored.

Many students viewed the question of the nation's willingness to rebuild New Orleans and its poorest neighborhoods as a litmus test of society's commitment to racial justice and equality. They considered the decision to continue the project following the Collaborative's dismissal as a modest act of solidarity in light of what an earlier generation of university students had done during Freedom Summer in 1964. Both student and faculty participants in the project believed that the team was in a unique position to collect data that would challenge several long-held assumptions regarding the Ninth Ward. A number of public and private-sector leaders had publicly questioned the advisability of reinvesting in the Ninth Ward, given the degree to which the local housing stock had been compromised by the storm, the slow rate of return of residents to the area, and the lack of commitment on the part of former residents to rebuild. Those involved in the Collaborative were concerned that the Ninth Ward would not be treated fairly given these unsubstantiated but widely held beliefs.

With a member of the Collaborative's faculty team placing $34,000 on his family's American Express Card with assurances from the community partner that they would find a way to cover the team's future expenses, the Collaborative brought approximately 80 students and faculty to New Orleans between October 25th and 29th to carry out the following field-based research activities:

- Inspecting 3,500 residential properties to determine their structural integrity.
- Surveying Ninth Ward sidewalks, streets, and curbs to evaluate their current condition.
- Evaluating the maintenance levels of 29 local playgrounds, parks, parkways, and residual open spaces.
- Documenting business sites along the Ninth Ward's four busiest commercial corridors.
- Interviewing 230 individuals from households in which members had returned to the Ninth Ward.
- Facilitating focus groups involving members of a dozen civic groups active within the Ninth Ward.[8]

The students expressed shock at the physical devastation they saw and seemed overwhelmed by the warm reception they received from the vast majority of Ninth Ward residents. Members of most returnee households took time out of their rehabilitation activities to share their deeply moving storm stories and equally passionate hopes for their community's future. Angered by what they perceived to be a poorly conceived and often uninspired recovery effort in the Ninth Ward, the students returned to campus committed to entering and analyzing the physical and social data they had collected to produce a comprehensive recovery plan that would clearly articulate the hopes and aspirations of local residents.

The Team's Research Findings

Among the major findings that emerged from the students' research were several observations that challenged local officials' assumptions regarding the Ninth Ward. (For a map of the survey area, see exhibit 2.) The following observations were among the students' findings:

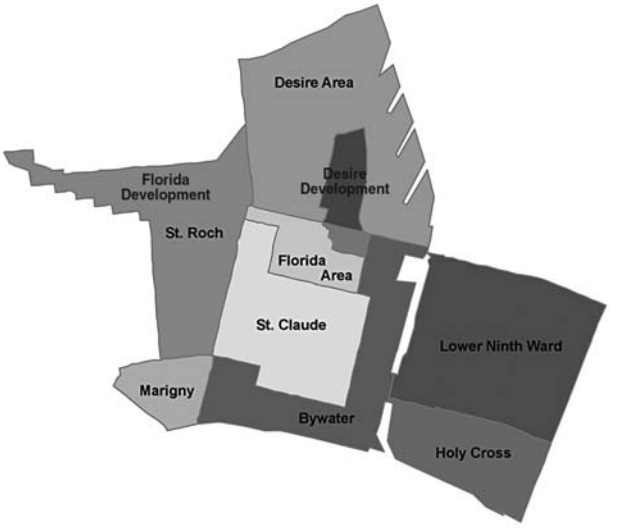
- Eight of ten of the Ninth Ward's standing residential structures were structurally sound.[9]
- The vast majority of those structurally sound structures were excellent candidates for cost-effective rehabilitation.
- The area where building demolition appeared justified was limited to a relatively small portion of the northwestern quadrant of the Lower Ninth Ward.
- A higher percentage of residents than had previously been reported appeared to have returned to the area to stay.
- Almost all of those who were restoring their homes were doing so to return as residents to the neighborhoods.

[8] A complete discussion of the Collaborative's research methodology is presented in *The People's Plan*, found at www.rebuildingtheninth.org. The team's basic research design was a mixed-methods approach that used a variety of quantitative and qualitative techniques, in a triangulated manner, to ensure a high level of reliability and validity.

[9] For a summary of the technical findings of the housing conditions survey, see Green, Bates, and Smyth (2007).

Exhibit 2

Ninth Ward Neighborhoods



Source: Greater New Orleans Community Data Center (http://www.gnocdc.org/mapping/docs/Neighborhood.pdf)

- The majority of those who were restoring their homes had not yet received either insurance or "Road Home" payments[10] and were funding their rebuilding activities with personal savings, liquidation of their 401(k) retirement accounts, gifts and loans from family members and friends, and cash and in-kind contributions from local, regional, and national religious organizations.
- Many of those interviewed feared they were making costly building design and construction errors that might jeopardize their ability to keep their properties.
- Those interviewed voiced the need for technical assistance in the areas of building design, construction management, and environmental science.
- Most returnees were in regular contact with family members and friends who had been evacuated from the Ninth Ward and wished to return but would not do so until some progress had been made in certain fundamental services, such as public schools, health care, and police protection.

Eager to share these results with the Collaborative's community partner, Ken Reardon presented a summary of the team's major findings and planning recommendations in New Orleans to representatives of the community partner. Wade Rathke, the community partner's chief organizer, said, "This is powerful stuff! These data contradict many of the key assertions of the Urban Land Institute and Bring New Orleans Back Commission reports that suggested the Ninth Ward's housing stock was damaged beyond repair and that few residents wished to return." Rathke asked if the team could transform its preliminary results into a compelling, high-quality, professional plan

[10] The Road Home Program was an initiative of the State of Louisiana in which homeowners received a grant in addition to their insurance payment to help cover the cost of either repairing or replacing their flood-damaged properties. This program was funded with federal passthrough funds from the Community Development Block Grant program.

that could withstand serious criticism from local planners, developers, and downtown advocates. He argued that the Collaborative members, as outsiders to the UNOP planning process, stood the best chance of influencing the city's approach to the Ninth Ward if the team could release its final document by January 6, 2007—10 days before the city's planning consultants would be issuing their plans. Having assured local leaders that, despite the rapidly approaching end of the semester and holiday season, the team could produce a high-quality, professional report, Reardon sent an e-mail to members of the Collaborative, informing them of the enthusiastic response their preliminary report had received. He then asked those who could to curtail their holiday celebrations by returning to Ithaca, New York, on December 28th to help transform the preliminary draft, which lacked essential statistical charts, GIS maps, and urban design sketches, into a well-organized, tightly written, and lavishly illustrated professional report.

The People's Plan

Four graduate students, three faculty members, two faculty spouses, and one undergraduate student returned to Ithaca on December 28, 2006, to produce *The People's Plan for Overcoming the Hurricane Katrina Blues: A Comprehensive Strategy for Promoting a More Vibrant, Sustainable, and Equitable 9th Ward* (ACORN Housing/University Consortium, 2007a). Another 12 students and faculty supported this core production team by contributing to the effort as "on-call/online" researchers, mapmakers, illustrators, and wordsmiths. Working 16-hour days during a 10-day period, this network succeeded in preparing a 170-page recovery plan aimed not at restoring but at transforming conditions in the nine neighborhoods comprising the Ninth Ward. *The People's Plan* featured 56 immediate, short-term, and long-term revitalization initiatives to address the environmental, healthcare, educational quality, employment opportunity, business service, affordable housing, public safety, and arts and cultural challenges that Ninth Ward residents had confronted well before experiencing the devastating effects of Hurricanes Katrina and Rita.

On January 6, 2007, a small group of students and faculty from the Collaborative flew to New Orleans to present the plan to 50 professional planners, civic leaders, elected officials, trade union allies, and members of the press who attended a breakfast briefing on *The People's Plan*. The official response to the plan was extremely positive. State Senator Ann Duplessis said, "This is awesome; you got it just right! These proposals, if enacted, would address the vast majority of the citizen complaints I am receiving in my district office." The president of the New Orleans City Council also voiced strong support for the plan, urging members of the Collaborative to formally petition the City Council and City Planning Commission to incorporate *The People's Plan* into the soon-to-be adopted comprehensive plan being prepared by the UNOP consultants. Immediately following this breakfast briefing, members of the team presented *The People's Plan* to an enthusiastic assembly of more than 100 Ninth Ward residents, who encouraged the team to seek immediate city endorsement of the plan (Burdeau, 2007).

The following day, two long articles appeared in *The Times-Picayune* newspaper, comparing the warm reception that the Collaborative's plan received from Ninth Ward residents to the ambivalent and sometimes hostile reception most of the plans produced by the UNOP consultants received (see Eggler, 2007, and Filosa, 2007). The writers attributed the broad-based support that *The People's Plan* appeared to enjoy to the participatory process that the team had used in prepar-

ing the document. The following week, an Associated Press wire story titled "9th Ward Can be Rebuilt, Planners Say," lauding the content of *The People's Plan*, began to appear in metropolitan newspapers across the country and overseas. Encouraged by the positive response that the plan was receiving and aware of the additional work needed to further refine the plan's immediate-term proposals, Cornell's CRP organized a followup workshop to prepare an executive summary of the plan and to formulate detailed implementation strategies for the plan's most important near-term projects (ACORN Housing/University Consortium, 2007b).

Pursuing Successful Implementation of *The People's Plan*

In February 2007, representatives of the Collaborative presented *The People's Plan* to the New Orleans City Council, which subsequently passed a unanimous resolution directing the city's staff to incorporate the main elements of the document into their comprehensive plan. In March, Collaborative representatives presented *The People's Plan* to members of the New Orleans City Planning Commission, which passed a similar resolution recommending the incorporation of the main elements of *The People's Plan* into UNOP's comprehensive plan. On March 30, 2007, Edward Blakeley, director of the Office of Recovery of the City of New Orleans, held a press conference to announce the outline of the city's $1.1 billion investment strategy. Of the 17 rebuild zones, where $145 million in public investment would be concentrated, 2 were located in the Ninth Ward in areas recommended by *The People's Plan* (Nossiter, 2007).

Although city officials were engaged in the final review of the UNOP plan, which received City Planning Commission and City Council approval in June 2007, students in Cornell's Community Development Workshop pursued three different strategies to advance the implementation of *The People's Plan*. First, they prepared a 31-page summary of *The People's Plan* that was widely distributed.[11] Second, they assisted the Collaborative's community partner in organizing policy briefings on the plan for representatives of major lending institutions in New Orleans, New York City, and Washington, D.C. Finally, they completed feasibility reports that described how a proposed community planning, design, development, and legal assistance center, together with a model mixed-use/mixed-income development contained in *The People's Plan,* could be implemented.

Meanwhile, the Collaborative's community partner concentrated on efforts to help Ninth Ward homeowners secure their insurance payments and Road Home grants. The partner also worked with LSU's Department of Architecture to build two single-family homes for long-term residents of the Ninth Ward that met all local building codes and Federal Emergency Management Agency (FEMA) elevation standards. Finally, the community partners worked with interested local, regional, and national lenders, as well as government agencies and philanthropic foundations, to assemble the capital needed to effectively assist homeowners wishing to rebuild their own structures and interested in moving into a model mixed-use development proposed for both the Ninth Ward and the New Orleans East neighborhoods. Although the community partner initially found considerable private-sector interest in its New Orleans homeowner rehabilitation and new construction initiatives, the disruption caused within the nation's mortgage markets by the growing subprime lending

[11] Copies of the "Executive Summary" of *The People's Plan* can be downloaded at www.rebuildingtheninth.org.

crisis appears to have caused many private investors to withhold their support for these initiatives pending some resolution of this problem. The number of subprime loans originated in the eastside neighborhoods of the city has unfortunately further complicated an already difficult development situation.

Lessons Learned

Through involvement in the organization and management of the Collaborative, the team has drawn the following tentative lessons from its ongoing involvement in relief and recovery efforts in New Orleans' Ninth Ward.

Data generated in the wake of major natural disasters such as Hurricanes Katrina and Rita may lack reliability and consistency. The initial damage assessments completed by FEMA-hired contractors, which formed the foundations for the initial Urban Land Institute report (ULI, 2005) and subsequent Bring New Orleans Back Commission's strategy recommending early investment in the city's least damaged areas, were tragically flawed. Poorly executed damage assessments for the Ninth Ward encouraged many public and private institutions to abandon short-term relief and recovery efforts, which discouraged many would-be evacuees from returning to their homes. If the Collaborative had not undertaken, at its own expense, a systematic survey of the structural conditions of the Ninth Ward's building stock that challenged these early results, city recovery officials may have conducted a large-scale clearance of neighborhoods in the Lower Ninth Ward, at great expense to the nation and at irreparable psychological harm to the neighborhoods' homeowners.

University-based engineering, architecture, landscape architecture, and urban planning programs can play a crucial role in enhancing the planning and design capacity of community-based organizations and municipal agencies following large-scale disasters. As shown by the successful implementation of the Collaborative's research into public recovery efforts in the Ninth Ward, higher education institutions helped individual neighborhoods complete comprehensive recovery plans and undertake specific revitalization projects. This work helped local institutions design and implement major improvement projects that they may not have been able to undertake on their own.

The ability of colleges and universities from outside the Gulf Coast region to make significant contributions to recovery efforts in New Orleans depended, in large degree, on schools establishing and maintaining mutually beneficial relationships with local community-based organizations. In the days and weeks following Hurricanes Katrina and Rita, the city's loose-knit network of social service agencies, churches, and grassroots organizations often had the best information regarding local conditions and needs. More often these organizations, rather than the city's planning and development agencies, reached out to colleges and universities requesting assistance for storm-damaged neighborhoods. These organizations frequently introduced sympathetic faculty from outside the region to specific grassroots organizations leading local recovery efforts. In many cases, these organizations helped visiting students and faculty locate facilities to house their volunteers, organizations to feed their workers, and local businesses to provide needed supplies. It is unlikely that many of the higher education institutions that came to New Orleans seeking to support local recovery efforts would have been able to do so without the guidance and assistance

of such groups as New Orleans ACORN, Common Ground, Broadmoor Neighborhood Association, and Holy Angels Roman Catholic Church.

Although the need to coordinate the efforts of the large number of colleges and universities involved in post-Hurricanes Katrina and Rita recovery activities has been clear throughout the past 3-plus years, little progress has been made in creating a clearinghouse to maximize higher education's contributions to the region's recovery efforts. Hundreds of colleges and universities have sent students and faculty to New Orleans to participate in short-term relief and recovery efforts. Dozens of higher education institutions have accepted the challenge to contribute, on an ongoing basis, to the region's long-term recovery efforts. Despite the scale of these efforts, little has been done to create a coordination mechanism to ensure that every community in need receives a fair share of available campus-based support. In addition, no systematic effort has been undertaken to match specific campuses possessing specialized forms of knowledge and expertise with communities in need of particular competencies. The absence of an office to coordinate such efforts also means that little of the experience, knowledge, skills, networks, and data created by the many campuses working in New Orleans has been shared—requiring each campus to reinvent its own version of the "campus guide to recovery planning."

Local, regional, state, and federal officials readily acknowledge the critical contributions that campuses have made to the Gulf Coast's recovery efforts. Little discussion has taken place, however, regarding how national recovery officials might work with appropriate disciplinary associations and national higher education organizations to create a national office capable of mobilizing and coordinating student and faculty resources in response to future regional or national disasters, such as the recent Southern California wildfires. It might make sense for the U.S. Department of Homeland Security (DHS) to convene a meeting of federal agencies and higher education institutions that participated in the post-Hurricanes Katrina and Rita relief and recovery efforts to discuss the establishment of a program and a process for mobilizing a cross-section of the nation's engineering, architecture, landscape architecture, urban planning, and social work programs in times of major regional and national disasters. With a modest amount of funding, the DHS could create a small grants program, similar in size and scope to the U.S. Department of Housing and Urban Development's former Community Outreach Partnership Program, to encourage campuses with relevant academic departments to establish or expand their disaster preparedness and recovery planning programs to introduce their students, faculty, and staff to principles of good practice in this rapidly expanding field; train an interdisciplinary core of campus faculty who, along with their students, could be mobilized in the event of major disasters; and fund the travel and field-based volunteer expenses of students, faculty, and staff who participate in this emerging form of national service. Success in establishing such an office might also lead to a discussion of how the Corporation for National Service might expand its AmeriCorps and VISTA programs to encourage high school and college graduates to devote a year to disaster-preparedness and recovery efforts in return for college loan forgiveness or tuition assistance. The overwhelming response that the Collaborative's requests for student volunteers received suggests that the current generation of U.S. college and university students is ready, willing, and able to make a serious contribution to the redevelopment of regions that have been devastated by natural disasters and official neglect.

Acknowledgments

The authors acknowledge the contribution that hundreds of Ninth Ward residents made to produce *The People's Plan* at a time when they were actively dealing with their own grief and yet engaged in efforts to rebuild their community.

Authors

Kenneth M. Reardon is a professor and director of The University of Memphis Graduate Program in City and Regional Planning.

Marcel Ionescu-Heroiu recently completed his Ph.D. in City and Regional Planning at Cornell University and is currently employed as a consultant by The World Bank in Washington, D.C.

Andrew J. Rumbach is a Ph.D. student in Cornell University's Department of City and Regional Planning.

References

Association of Community Organizations for Reform Now (ACORN). 2006. *Rebuilding After Hurricane Katrina: ACORN Planning Principles*. New Orleans: ACORN.

ACORN Housing/University Consortium. 2007a. *The People's Plan for Overcoming the Hurricane Katrina Blues: A Comprehensive Strategy for Building a More Vibrant, Sustainable, and Equitable 9th Ward*. Ithaca, NY: Cornell University, Department of City and Regional Planning.

———. 2007b. "Executive Summary." In *The People's Plan for Overcoming the Hurricane Katrina Blues: A Comprehensive Strategy for Building a More Vibrant, Sustainable, and Equitable 9th Ward*. Ithaca, NY: Cornell University, Department of City and Regional Planning.

Barry, John M. 1998. *Rising Tide: The Great Mississippi Flood of 1927 and How It Changed America.* New York: Touchstone Books.

Boyer, Ernest. 1994. "Creating the New American College," *The Chronicle of Higher Education* (March 9): 48–49.

Burby, Raymond J., Robert E. Deyle, David R. Godschalk, and Robert B. Olshansky. 2000. "Creating Hazard Resilient Communities Through Land-Use Planning," *Natural Hazards Review* 1 (2): 99–106.

Burdeau, Cain. 2007. "9th Ward Can Be Rebuilt, Planners Say," *The Times-Picayune*, January 8.

Campanella, Richard. 2006. *Geographies of New Orleans: Urban Fabric Before the Storm*. New Orleans: Center for Louisiana Studies.

Cisneros, Henry G. 1996. *The University and the Urban Community*. Washington, DC: U.S. Department of Housing and Urban Development.

Davidoff, Paul. 1965. "Advocacy Planning and American Pluralism," *Journal of the American Institute of Planners* 31 (4): 596–615.

Eggler, Bruce. 2007. "Planning Process OK, Speakers Say; Continued Public Participation Urged as Document Is Revised," *The Times-Picayune*, January 8.

Ferguson, Ronald, and Sara Stoutland. 1999. "Reconceiving the Community Development Field." In *Urban Problems and Community Development*, edited by R.F. Ferguson and W.T. Dickens. Washington, DC: Brookings Institution: 33–76.

Filosa, Gwen. 2007. "ACORN Offers Its Own Plan," *The Times-Picayune*, January 7: 1–3.

Green, Rebekah, Lisa K. Bates, and Andrew Smyth. 2007. "Impediments to Recovery in New Orleans' Upper and Lower 9th Wards," *Disasters* 31 (4): 311–335.

Gustafson, Suzy. 2005. "CRP Helps ACORN Plan for Rebuilding New Orleans," *The Cornell Daily Sun*, October 26.

Horne, Jed. 2006. *Breach of Faith: Hurricane Katrina and the Near Death of a Great American City*. New York: Random House.

Kelman, Ari. 2003. *A River and Its City: The Nature of Landscape in New Orleans.* Berkeley, CA: University of California Press.

Kennedy, Marie, Chris Tilly, and Mauricio Gaston. 1991. "Transformative Populism and the Development of a Community of Color." In *Dilemmas of Activism: Class, Community, and the Politics of Local Mobilization,* edited by Joseph M. Kling and Prudence S. Posner. Philadelphia: Temple University Press.

Krumholz, Norman. 1990. *Making Equity Planning Work: Leadership in the Public Sector.* Philadelphia: Temple University Press.

Lewis, Peirce F. 2003. *New Orleans: The Making of an Urban Landscape.* Santa Fe, NM: The Center for American Places.

Liebling, Abbott Joseph. 1970. *The Earl of Louisiana.* Baton Rouge: Louisiana State University Press.

McPhee, John. 1989. *The Control of Nature.* New York: Farrar, Straus, and Giroux.

McQuade, John, and Mark Schleifstein. 2006. *Path of Destruction: The Devastation of New Orleans and the Coming Age of Superstorms.* New York: Little, Brown, and Company.

Mezirow, Jack. 1991. *Transformative Dimensions of Adult Learning.* San Francisco: Jossey-Bass.

Nossiter, Adam. 2007. "New Orleans Proposes to Invest in 17 Areas," *The New York Times*, March 29.

Peterman, William. 2000. *Neighborhood Planning and Community-Based Development: The Potential and Limits of Grassroots Action.* Thousand Oaks, CA: Sage Publications.

Rubin, Herbert J. 2000. *Renewing Hope within Communities of Despair: The Community-Based Development Model.* Albany, NY: State University of New York Press.

Schramm, Richard, and Nancy Nye. 1999. *Building Higher Education-Community Development Corporation Partnerships*. Washington, DC: U.S. Department of Housing and Urban Development, Office of University Partnerships.

Starr, Roger. 1976. "Making New York Smaller," *New York Times Magazine,* November 14: 32–33, 99–106.

Toigo, Jon William. 2002. *Disaster Recovery Planning: Preparing for the Unthinkable*. Upper Saddle River, NJ: Prentice Hall.

Unified New Orleans Plan (UNOP). 2006. *Draft General Scope of Services: District Planning Teams.* New Orleans: Unified New Orleans Plan: 1–7.

Urban Land Institute (ULI). 2005. *A Rebuilding Strategy for New Orleans, LA*. Washington, DC: Urban Land Institute.

Vale, Lawrence J., and Thomas J. Campanella. 2005. *The Resilient City: How Modern Cities Recover from Disasters.* New York: Oxford University Press.

Williams, Harry T. 1969. *Huey Long.* New York: Alfred A. Knopf.

Additional Reading

American Institute of Certified Planners. www.planning.org.

Association of Community Organizations for Reform Now (ACORN). www.acorn.org.

———. 2006. *Rebuilding After Hurricane Katrina: ACORN Planning Principles*. New Orleans: ACORN: 1–25.

Bring New Orleans Back (BNOB) Commission. 2006a. "Executive Summary." *Action Plan for New Orleans: The New American City*. New Orleans: Bring New Orleans Back Commission: 1–17.

———. 2006b. *Action Plan for New Orleans: The New American City*. New Orleans: Bring New Orleans Back Commission, Urban Planning Committee.

The Brookings Institution, Metropolitan Policy Program. 2005. *New Orleans after the Storm: Lessons from the Past, a Plan for the Future*. Washington, DC: The Brookings Institution: 1–43.

Katznelson, Ira. 1982. *City Trenches: Urban Politics and the Patterning of Class in the United States.* Chicago: University of Chicago Press.

Maurrasse, David. 2001. B*eyond the Campus: How Colleges and Universities Form Partnerships with Their Communities*. London, UK: Routledge.

Myers, Linda. 2006. "Cornell Students 'Speak for Justice' by Rebuilding Minority Neighborhoods in New Orleans," *The Cornell Daily Chronicle,* May 23.

New Orleans Community Support Foundation. 2006. *City-wide and Neighborhood Planning Teams: Request for Qualifications, Questions and Answers.* New Orleans: New Orleans Community Support Foundation: 1–10.

New Orleans Planning Initiative. 2006a. *ACORN-University Collaborative, Summer Internship Program*. Ithaca, NY: Cornell University, Department of City and Regional Planning: 1–3.

———. 2006b. *Engaged Scholarship*. Ithaca, NY: Cornell University, Department of City and Regional Planning.

Piazza, Tom. 2005. *Why New Orleans Matters?* New York: Harpers.

Reardon, Kenneth M. 2006. "The Shifting Landscape of New Orleans," *Progressive Planning Magazine* 146 (Spring): 15–20.

———. 2005. "Empowerment Planning in East St. Louis: A Peoples' Response to the Deindustrialization Blues," *CITY* 9 (1): 85–100.

———. 2000. "An Experiential Approach to Creating an Effective Community-University Partnership: The East St. Louis Action Research Project," *Cityscape: A Journal of Policy Development and Research* 5 (1): 59–74.

Rebuilding the Ninth. www.rebuildingtheninth.org.

Rivlin, Gary. 2006. "All Parts of City in Rebuild Plan of New Orleans," *The New York Times, January 8.*

Stanton, Timothy K., Nadinne I. Cruz, and Dwight E. Giles. 1999. *Service-Learning: A Movement's Pioneers Reflect on Its Origins, Practice, and Future.* San Francisco: Jossey-Bass.

The Times-Picayune. 2002. "Washing Away," five-part special report, June 23–27. http://www.nola.com/hurricane/content.ssf?/washingaway/index.html.

White, Richard D. 2006. *Kingfish: The Reign of Huey P. Long.* New York: Random House.

Rebuilding Community Block by Block

Marsha R. Cuddeback
Frank M. Bosworth
Louisiana State University

Abstract

In 2003, Louisiana State University's (LSU's) Office of Community Design and Development was awarded a U.S. Department of Housing and Urban Development Community Outreach Partnership Center Community Futures Demonstration grant to investigate new prototypes for sustainable affordable housing. Following the devastation of New Orleans by Hurricane Katrina in August 2005, the focus of the grant was shifted to developing a homebuilding training program for New Orleans residents that resulted in the construction of the first two, new post-Hurricane Katrina houses in the Lower 9 neighborhood on the north side of the Lower 9th. A construction team of previously unskilled workers and 13 fourth-year students in the undergraduate professional degree program in architecture at LSU completed the work. This enterprise is discussed in the context of community participation, service learning, and the capital market for affordable housing in New Orleans at the time of the project. The demonstration project has not secured additional funding for continuation at this time; however, the process was deemed successful and the authors suggest six actions for replicating the program.

> "It was a spiritual experience. I put myself in the shoes of the ladies who had lost their house(s). I went outside and just stared at the house(s). To lose everything then to come back to the same area, where two new houses are going up. That is miraculous. And it touched my heart, and I know the joy they felt."
>
> *Brother K., Bethel Colony South, Community Construction Team Member*

Introduction

This article represents an extraordinary tale of grassroots reconstruction, collaborative learning among diverse stakeholders, the power of service learning,[1] and the capacity of partnerships to serve as a catalyst for positive change despite the overwhelming obstacles that existed in post-Hurricane Katrina New Orleans. The plan was simple: rebuild the community house by house and block by block, not unlike the manner in which the community originally developed. The project was a product of a U.S. Department of Housing and Urban Development (HUD) Community Outreach Partnerships Centers (COPCs)[2] Community Futures Demonstration grant awarded to Louisiana State University's (LSU's) Office of Community Design and Development (OCDD). It was conceived to demonstrate a method for rebuilding economically stable and sustainable neighborhoods through teaching unskilled residents the art and science of homebuilding. The project was a bottom-up approach to neighborhood redevelopment that acknowledged the importance of social capital and the value of community engagement, and it relied on academic theories of experiential learning and continual assessment and feedback to shape it. In its final incarnation (see exhibit 1), the project site was the classroom and the partnership a learning community very different from those typically occurring at the university.

At the conclusion of the project, the first two, new post-Hurricane Katrina houses in the Lower 9 were built and occupied (see exhibit 2); a team of unskilled residents learned homebuilding skills; and

Exhibit 1

The Project Site As the Classroom in the Lower 9 Neighborhood, New Orleans

Construction work in progress at 2310 and 2314 Delery Street in the Lower 9 neighborhood, New Orleans, Louisiana. Photo credit: Marsha Cuddeback.

[1] Alan Waterman (1997: 2) in his book, *Service-learning: Applications from the Research*, describes service-learning as "…a method (A) under which students learn and develop through active participation in thoughtfully organized service experiences that meet actual community needs and that are coordinated in collaboration with the school and community; (B) that is integrated into the students' academic curriculum or provides structured time for the student to think, talk, or write about what the student did." The pedagogical approach used to develop the academic strategies for service learning is a product of more than 20 years of research in this area. Salient works that have contributed to the development of Cuddeback and Bosworth's approach appear in the Additional Reading section at the end of this article.

[2] This program area is not new for HUD's Office of Policy Development and Research. For more information on an earlier work on affordable housing by COPCs, see Wiewel, Gaffikin, and Morrissey (2000).

Exhibit 2

The First Two, Newly Built Houses in the Lower 9 Neighborhood, New Orleans

A worker adds finishing touches to completed houses at 2310 and 2314 Delery Street in the Lower 9 neighborhood, New Orleans, Louisiana. Photo credit: Marsha Cuddeback.

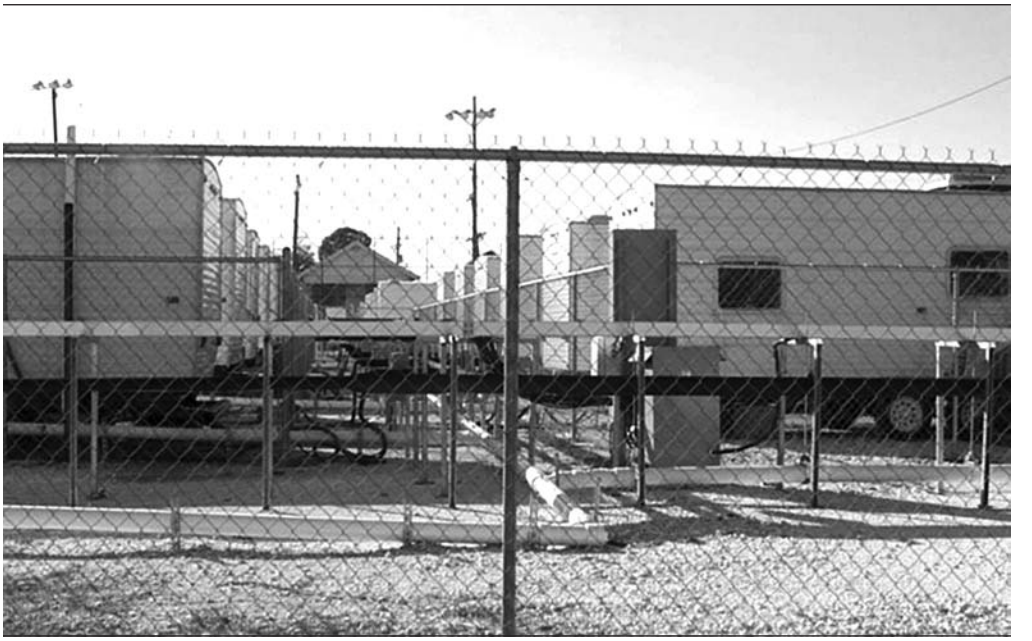
the neighborhood was hopeful about its future. Occupied houses in the immediate neighborhood grew from 2, when the project started, to 12, when it ended, with five requests to build additional new homes nearby. Actualizing the demonstration project was far more complex and challenging than anticipated, however, and sustaining it in New Orleans at that time was not possible. For the participants, the project was more than an experimental building project; the hands-on engagement in the community was an emotional experience that required us to gauge success both qualitatively and quantitatively.

Two months after Hurricane Katrina made landfall along the Gulf Coast, thousands of New Orleanians and others residing along areas of the Gulf Coast impacted by Hurricanes Katrina and Rita were displaced and now lived as refugees in temporary Federal Emergency Management Agency (FEMA) trailer home communities (see exhibit 3). Perhaps more unsettling, 2 1/2 years later, the refugees in New Orleans are displaced yet again, having been evacuated from their temporary FEMA trailer homes because of high levels of formaldehyde resulting from the processes used in manufacturing the trailers.

Currently, 38,000 FEMA trailers are still in use along the Gulf Coast, housing approximately 100,000 people; 30,000 of the trailers are located on private property, and it is questionable whether forced evacuation, even as a last resort, is even possible. The net result is more pressure

Exhibit 3

Gulf Coast Residents Living in Temporary Trailer Communities



A FEMA trailer settlement in New Orleans, Louisiana, in 2006. Photo credit: Marsha Cuddeback.

on the already limited housing resources and higher rents (Williams, 2008). The Katrina Cottage program, funded by the FEMA alternative housing program in both Mississippi and Louisiana, is intended to relieve some of the pressure for housing, but it is only having a small effect. Although the Mississippi Katrina Cottage program has provided more than 1,600 housing units, Louisiana has yet to build one (Gautreau, 2008). Nonetheless, Donald Powell, the head of President Bush's hurricane recovery team, stepped down on March 1, 2008, saying that he had accomplished his goal to get Louisiana, Mississippi, and Alabama back on their feet (Shields, 2008).

Those concerned with the development of replacement housing have had some effect; however, no coordinated effort exists, nor is sufficient resource allocation available to address how to rebuild the thousands of houses and apartments destroyed by the storms. The Louisiana Recovery Authority (LRA) is still distributing funds for rebuilding, but with insufficient funding to meet the actual need, which is resulting in payouts that are less than homeowners anticipated and amounts insufficient to rebuild replacement houses. Whatever the causes, the traditional approaches to replacing housing stock are not working.

It is not surprising that these approaches are not working because rebuilding requires working directly with individual homeowners, and, as Achtenberg and Marcuse (1986) pointed out 25 years ago, "Government policies affecting housing, which supposedly serve the common good, systematically operate to reinforce the profitability of the housing sector and of the business community as a whole" (Achtenberg and Marcuse, 1986: 4).

For pre-Hurricane Katrina homeowners, the LRA's Road Home program continues to provide resources to pay off mortgages on nonexistent houses and provide seed money to start over. The intent, however, is directed toward replacing, not improving, the homes of the residents, and little, if any, consideration is given to the culture of place and the quality of life for the residents as they rebuild their neighborhoods. In fact, the Road Home program has gone to great lengths to ensure that no person receives more than is required to replace, as closely as possible, what existed prior to Hurricane Katrina. Our challenge was to use the resources of our COPC Community Futures Demonstration grant to help the residents of the neighborhoods in the Lower 9 help themselves to rebuild their homes, their neighborhoods, and their lives, knowing at the start that this would not be a typical self-help endeavor and that success would rely on the necessity to serve the interests of private capital as pointed out by Achtenberg and Marcuse, (1983). At this time, it is clear that as a result of the total destruction of physical capital in the targeted project area, any rebuilding in the Ninth Ward will need to rely heavily on neighborhood social capital to achieve long-term neighborhood objectives (see Arefi, 2004).[3]

Evolution

The original enterprise was conceived and implemented by the outreach office of the LSU School of Architecture, OCDD. The project began in November 2003, when LSU was awarded a COPC Community Futures Demonstration grant funded through HUD. The purpose of the initiative was to conduct research culminating in innovative strategies for strengthening the production of good-quality, affordable homes. In our case, the initial focus was in Baton Rouge, Louisiana, where we partnered with a local nonprofit to build three demonstration projects. We completed one home in Baton Rouge, partnering with Habitat for Humanity, but following the events of August 29, 2005, when Hurricane Katrina made landfall, the remaining grant funds were reallocated to refocus the goals of the project to develop a replicable, affordable homebuilding training program in the Lower 9 neighborhood in the Ninth Ward of New Orleans and build three hurricane-resistive and energy-efficient demonstration homes. The primary outcomes for the project were to train unskilled men and women in homebuilding construction work, build capacity in neighborhoods to rebuild their communities, create jobs, and reconnect the neighborhood social networks broken by the storms.

Project planning occurred in the spring and summer of 2006, culminating with the participant-training component on September 25, 2006. The construction team consisted of the trainees, a diverse group of New Orleans residents, and 13 fourth-year LSU School of Architecture students. (To see a photo of 17 members of the construction team on the first day of construction, log onto http://www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html.) Construction of the houses began several days later and was completed mid-February 2007.

The tangible product of the training program was two new homes. They were the result of a partnership among OCDD; Association of Community Organizations for Reform Now (ACORN) Housing

[3] Arefi does not address the condition in which a total loss of physical capital is in his analysis; however, it seemed logical to assume, based on his three categories of the nexus of needs and assets in neighborhoods, that, as physical capital diminishes, the need for social capital increases (Arefi, 2004).

Inc. (AHI), acting as developer; ACORN Services Inc. (ASI), acting as the general contractor; and Countrywide Bank, providing the project financing.[4] After the project was under way, it became the beneficiary of many volunteers, including the Canadian Auto Workers, Unitarian Universalist Association of Congregations, Louisiana Delta Service Corps, and Pulitzer Prize-winning novelist Richard Ford, among many others. Resources for landscape materials and toolkits for each trainee were donated by the Unitarian Church of Baton Rouge. Word of the project spread among the displaced residents and, when a sermon delivered in a local church in Rochester, New York, reported the news of these first new homes, Charles Barkley, retired forward of the Houston Rockets, visited the homes during construction, raising spirits in the Lower 9 neighborhood and spreading awareness of the severe conditions in the Ninth Ward 1 year after the storm. Throughout the project, the houses attracted visitors who wanted to become actively engaged in this tangible effort. As the houses took shape, the project became a symbol of progress and attracted tourist buses that drove by frequently to show visitors that, in the midst of the rubble, positive things were happening.

Location and Homeowners

The project site is located in the Lower 9 neighborhood, one of three sections of the Ninth Ward. The Ninth Ward is the largest and one of the most recognized by name of the 17 wards of New Orleans. The Lower 9th is separated from the rest of New Orleans by the Industrial Canal, with East New Orleans and the Upper 9th on the west side and the Lower 9th to the east of the Canal. (To see a pre-Hurricane Katrina aerial photograph [from Google Earth, http://earth.google.com/] showing the project location in the upper right area of the image, the Mississippi River at the bottom of the image with the Holy Cross neighborhood immediately adjacent, the Industrial Canal on the left, and Jackson Barracks to the right, log onto http://www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html.)

Geographically, the Lower 9th extends to the Mississippi River Gulf Outlet Canal on the north, the Mississippi River on the south, and the Industrial Canal on the west, where two floodwall sections toppled in the early morning hours of August 29, 2005, resulting in catastrophic flooding. Along its eastern edge, the Ninth Ward is separated from St. Bernard Parish by Jackson Barracks, the headquarters for the Louisiana National Guard and another casualty of Hurricane Katrina (WPA, 1940). (To see a photo of Work Projects Administration workmen in 1940 constructing gutters near the entrance on Delery Street (looking north) with Jackson Barracks on the right, log onto http://www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html.)

The Lower 9th consists of two neighborhoods on the north and south sides of St. Claude Avenue. The Holy Cross neighborhood on the south side is the oldest settlement in the Lower 9th and is home to the famous steamboat houses and Fats Domino's residence. On the north side is the second neighborhood, commonly referred to as the Lower 9, where the project site is located.

[4] The financing for the project was a collaborative effort between AHI and Countrywide Bank (and subsidiaries). AHI provided construction loans based on promised LRA funds or insurance payouts pledged to repay the loans, and Countrywide provided the mortgage financing.

Before Hurricane Katrina came ashore, the Lower 9th was a predominantly African-American, working-class community with owner-occupied housing exceeding 59 percent. As described by the Greater New Orleans Community Data Center, "The neighborhood is rich with small businesses, barber and beauty shops, corner stores, eateries, day care centers, as well as public schools and some say, far too many churches. It has a resilient history of survival and activism" (Greater New Orleans Community Data Center, 2002). As a result of the massive damage caused by Hurricane Katrina, the Lower 9 neighborhood was one of the most severely depopulated areas of New Orleans (see exhibit 4). (To see images [aerial photographs acquired from Google Earth, http://earth.google.com/] indicating the project site showing the damage to the project area after the storm, log onto http://www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html.)

Most homes in the Lower 9 neighborhood were built between 1949 and 1980, and much of the area was platted with 26-foot-wide wide lots (New Orleans Public Library, 1949). Many of the houses were located on double and, sometimes, triple lots. The area had a true mix of housing—shotguns, side-by-sides, bungalows, and newer, single-story, slab-on-grade homes built in the 1970s and 1980s. Before Hurricane Katrina destroyed the neighborhood, some of the houses were in poor repair, some were well maintained, but, nonetheless, this neighborhood was active, safe, stable, friendly, and home to intricate social networks of friends and families.

The pre-Hurricane Katrina population of the Lower 9th was estimated to be slightly more than14,000. No firm post-Hurricane Katrina population estimates exist; however, according to postal delivery statistics, in March 2007, the U.S. Postal Service made 0 to 500 active residential deliveries per square mile in the Lower 9th (approximately 1.4 square miles). Since the hurricane

Exhibit 4

Hurricane Katrina's Damage to Houses in the Lower 9 Neighborhood in New Orleans

The remains of the home at 2310 Delery Street, Lower 9 neighborhood, New Orleans, Louisiana, following Hurricane Katrina. Mr. and Mrs. Butler built the house in 1949. Photo credit: Marsha Cuddeback.

occurred, the city of New Orleans has issued more than 1,110 building permits in the Lower 9th, broken down as follows: 7 percent for new construction, 2.5 percent for additions, 4 percent for nonstructural renovations, 1.5 percent for structural renovations, and 85 percent for repairs. Although the news reports often characterize the situation in the Lower 9th as grim, in fact, people are slowly returning and rebuilding their homes and lives. Of the 6,802 pre-Hurricane Katrina housing units, more than 5,700 (82 percent) incurred damage from the storm, of which 4,679 (69 percent) suffered severe damage or were destroyed. Houses that were destroyed by the storm are slow to be replaced, with only 83 new-construction building permits issued since August 29, 2005—less than 2 percent of the total number of housing units that suffered severe damage or were destroyed.

The pace of reconstruction is further complicated by the conflicting points of view regarding re-settlement. Early on, the mayor of New Orleans suggested the area should not be reused for housing, based on a planning document prepared by the Urban Institute, calling for the city to reduce its footprint, make the Lower 9 neighborhood a wetlands for stormwater control, and implement a federally funded forced buyout for homes in neighborhoods determined to be unlivable. Other contingents supported depopulating the area north of Claiborne Avenue and providing land on the south side (Holy Cross neighborhood in the Lower 9th) for those to be displaced. In addition, long-time residents such as project homeowners Mrs. Geraldine Butler and Ms. Gwendolyn Guice wanted to come home and rebuild; they consider themselves pioneers in the rebirth of their neighborhood (see exhibit 5). Mrs. Butler's original house, which her late husband built in 1949 when the area was mostly woods, was on the same lots where she is rebuilding. As Mrs. Butler said, "I was here the first time this neighborhood grew up and I'm back to watch it come back."

Exhibit 5

Long-Time Residents Rebuild Their Lower 9 Neighborhood

Mrs. Geraldine Butler (left) and Ms. Gwendolyn Guice stand in front of the new, post-Hurricane Katrina house at 2314 Delery Street, Lower 9 neighborhood, New Orleans, Louisiana. Photo credit: Marsha Cuddeback.

Regardless of the controversy, it is a monumental task to rebuild thousands of houses and the infrastructure to support them, and in the Lower 9 neighborhood it is unlikely to happen any way other than house by house as residents decide to return home or sell their lots. Assembling large parcels for redevelopment is difficult because people are reluctant to sell their land and it is difficult to attain clear title for adjudicated properties. The result is that neighborhood-planning studies are difficult if not impossible to implement when any acquisition or change of use of private property is involved. To further compound the problem, as a country, we have great experience with urban infill housing, redevelopment of large urban tracts, and development of raw land in the suburbs, but we know little about large-scale building endeavors to repopulate a city where multiple owners hold land privately as individual lots and small parcels. The resulting overall lack of development control creates an undesirable risk for any homeowner or speculator because there is no knowledge of how adjacent land will be developed and the impact it may have on the homeowner. In this situation, funding sources for development are more difficult to find and cost more, and homeowners and developers are reluctant to proceed. In a housing market where there is a high demand for production, the tolerance for risk is low, resulting in resources shifting to housing "only when it is profitable for developers, land speculators, materials producers and mortgage lenders to do so."[5]

Methodology

The methodology employed for actualizing this demonstration project was based on the assumption that the process can, and would, be replicated if the process methodology were considered a true economic development engine, as well as a training program, and if it met the following criteria:

First, that it would support residents by creating job opportunities and by providing skill development that would assist with the reconstruction of the Lower 9 neighborhood for at least one generation (the time we estimate it will take to stabilize and make the neighborhood sustainable).

Second, that it would create economic growth in the immediate community by increasing population, which would result in the creation of new businesses and new jobs.

Third, that it would support the local economy through circulating capital generated by wages and expended for materials and services in New Orleans or Orleans Parish, rather than out of the city or parish. This criterion will minimize hiring out-of-state contractors and suppliers and reduce capital flow out of the state.

To implement this enterprise, the project was divided into four distinct phases:

1. Design.
2. Preconstruction preparation.
3. Experiential construction training.
4. Postconstruction evaluation.

[5] Achtenberg and Marcuse (1986: 5) point out that housing as commodity is tethered to the capital markets. The rebuilding effort in New Orleans is not a "public" effort, because the decision was to provide capital for rebuilding to homeowners to use in the homebuilding marketplace. Clearly, without broad incentives that lower risk for developers and homeowners and that rebuild social capital to create stable neighborhoods, the redevelopment problem will remain intractable.

Phase 1 began with community-driven planning and design (discussed later in this article), followed by what we discovered to be one of the most significant components to the success of the project—the preconstruction preparation. This phase included training materials preparation, quantity take-offs and cost estimating, site acquisition, tool acquisition, and material deliveries organization and onsite storage. It also included finding subcontractors interested in participating in the training program, assembling the training team, and selecting the participants for the community construction team. Thorough preconstruction planning ultimately proved to be crucial to meeting the construction schedule. The OCDD consultant, who completed the initial scheduling and estimating, established a work plan to build three homes in 30 working days by applying a heretofore untested, incremental building system. Our first setback occurred the day the surveyor finished staking out the piles. Without warning, the owner of the third house pulled out of the project, leaving only two houses to build, and requiring the consultant to redraft the work plan. Other setbacks were the result of working in a very challenging environment, where there were many material shortages and fluctuations in material prices as a result of the high demand and limited number of suppliers.

As the project progressed, it became clear that the incremental building system was not working and that the construction time would extend past the original 30-day estimate. The project team was composed of a training team, project supervision and coordination, community construction team, and fourth-year architecture students.

The training team was composed of four consultants: a project manager, a licensed contractor/training instructor, and two community construction team tracking coordinators.

The principle investigators (authors) and representatives from AHI were responsible for overall project supervision and coordination, the project manager was responsible for all work directly related to construction, and ASI managed the payroll for the community construction team. The principle investigators completed the evaluation and assessment of all participant teams involved with the project.

The community construction team was composed of displaced, in-place New Orleans residents (their homes and/or family were gone, but they remained in New Orleans): young people from Covenant House New Orleans, a safe-haven for at-risk homeless youth, ages 16 to 21; men from Bethel Colony South (see exhibit 6), a faith-based substance abuse recovery program, who had remained in New Orleans during the storm organizing and facilitating rescue services for residents trapped in their homes; and West Bank Vietnamese residents, who had lost their fishing/shrimp boats and homes to the hurricane, had relocated to New Orleans, and were now employed by ASI gutting and cleaning damaged properties. The community construction team totaled 30 members: 12 young men and women from Covenant House, 10 employees from ASI, and 8 Brothers from Bethel Colony South. (The term “Brother” is used to address both program members and nonmembers of the community.)

In addition, 13 fourth-year architecture students, under the supervision of the authors, traveled 65 miles from Baton Rouge to the project site every Monday, Wednesday, and Friday to work side by side with the community construction team, earning 6 credit hours for the semester. Before the construction start date, the training team conducted a comprehensive interview with each team

Exhibit 6

Displaced, In-Place New Orleans Residents Become Part of the Construction Team

Pastor Melvin Jones, founder of Bethel Colony South, oversees the roof framing of the House at 2310 Delery Street, Lower 9 neighborhood, New Orleans. Photo credit: Marsha Cuddeback.

member to ensure compatibility with the program. Through self-attrition, 25 participants remained and completed the preconstruction training.

Community Engagement

In the spring of 2005, under the supervision of the OCDD, students in the School of Architecture fourth-year design studio undertook the preliminary research and design of the prototype houses. The students commenced the design phase by inviting the community members to actively participate in the design of the prototype houses (see exhibit 7). The purpose of the community events was to empower the community members to participate in, and make decisions about, the rebuilding of their community. During the semester, ACORN members, who organized and hosted several community meetings for residents of the project area, assisted students, enabling them to reach a large number of displaced residents. Based on the data and design preferences gathered from the residents, the students' design of the prototype houses reflected the priorities established by community input.

Before the storm, most affordable housing in the New Orleans area had been constructed without sufficient attention to design,[6] because the primary objective was to create simple, expedient, and low-initial-cost houses. This predominant model is not driven by expectations of end users but by

[6] We use *design* in its most broad context to include building systems, construction materials, sustainability, and so forth, as well as appearance, in order to conceive of the house holistically.

Exhibit 7

Community Members Participate With Students in the Design Process

Engaging the community in design decisions was part of the community participation phase of the house design. Community participants were present from across the United States as a result of being displaced. Louisiana State University architecture students facilitated the event as part of their service-learning course requirements. Photo credit: Marsha Cuddeback.

the most expedient fit with the prevailing market conditions. The fundamental expectations for the project described in this article emerged from a different paradigm because of the critical nature of community participation in both the design of the houses and community redevelopment. These expectations yielded an important design objective to enable the purchaser to have some voice in the final product, with the understanding that the overarching priorities for an affordable house required a reasonable initial cost (final purchase price), low life-cycle costs, and high owner satisfaction. Following these priorities resulted in quality houses that remained viable in the real estate marketplace.

The methods and procedures the students used to gather data were based on the work of Henry Sanoff (1999).[7] Because Sanoff's work is written from a designer's point of view, it is the most accessible for undergraduate architectural students. The basic procedure consisted of asking the residents an open-ended question such as, "What features would you like to have added to a standard three-bedroom, one-bathroom home?" To assist them with their responses, the students also showed the residents several floor plans of affordable housing from the New Orleans region. The students then ranked the responses, which indicated that the most frequently requested feature was a second bathroom, followed by a utility room and "lots of" closet space. Using an analysis of 30 affordable houses completed earlier by the authors as a comparison, it was apparent that these were features commonly eliminated in an effort to build the "cost-effective" solution.[8] Using the data from the community participation activities, the students developed the designs for the houses

[7] Although Sanoff (1999) was the primary methodological influence for the community events because of its direct applicability and accessibility to undergraduate students, others formed the underpinnings for the participatory action research: Greenwood, Whyte, and Harkavy (1993) for the commentary on human interaction; Glass (1979) for the fundamentals; Eade (1997) for capacity building in emergency situations; Fainstein (2000) for the commentary on the "Just City model"; and Innes (1995), Day (1997), and Kumar (2002) for insight on citizen participation. Because community design decisions are primarily qualitative and cannot be generalized beyond the participating population, we relied on the community to validate decisions based on the data collected. A recent addition to the literature for architects and designers by Barbara Fagan (2006) with a foreword by Alexander Garvin would have been very useful for the students.

[8] The number of bathrooms varied among the houses analyzed, but there was no consistency about the addition of a second bathroom until a fourth bedroom was added. The prototype houses contained three bedrooms that most frequently were organized in a single-bathroom configuration. At the time of the study, no new-construction, single-bath, single-family homes were in the marketplace for comparison.

in response to the residents' preferences. The most favored design solutions were those that embraced traditional and recognizable forms,[9] while accommodating space planning that supported a contemporary lifestyle.

After the students completed the initial design alternatives, they took the floor plans and façade studies to another community forum for feedback regarding their interpretation of the data gathered earlier. After considering the community feedback, the students made final adjustments to the design and completed the construction drawings. Features included in the designs were mold-, insect-, and water-resistant exterior materials; a raised pile and girder structural foundation; high-wind framing connections; solar-activated attic ventilation; roof-mounted condensing units accessible through the attic; a PEX (cross-linked polyethylene) water distribution system; low E II insulating windows with exterior screens; and outswinging exterior doors (for hurricane protection). Through a donation from Sharp Electronics Corporation, manufacturer of residential solar systems, one of the homes was equipped with roof-mounted solar panels. It is estimated that the panels will reduce the owner's energy costs by 10 to 15 percent annually.

After the lots and owners of the homes were confirmed, the students made additional design changes at the request of the owners, including relocating the kitchen in one house and adding a bedroom and bath in the other. Using a process similar to market-rate home construction, the owners also selected light fixtures, paint colors, cabinet finishes, countertop colors, hardware, carpet, and laminate floor color. By the time the houses were finished, the owners were fully invested in their properties and had already established a personal identity with their new home.

Teaching and Learning Objectives

Teaching and learning form the foundation for this project. The project's success depended on both the community construction team and the architecture students performing to their capacity. Because the project was focused on training, the teams needed to learn the skills necessary to become a home builder or become part of a homebuilding crew (see exhibit 8). To reach this objective, the project consultant developed learning objectives for the team and the authors developed learning objectives for the students participating in the service-learning class. The construction team's learning objectives consisted of (1) learning about what is required to get and keep a job; (2) learning a new skill set; (3) building a new career; (4) developing life skills (such as how to manage time, earn a wage, stabilize themselves); (5) having a hands-on, active, building experience; and (6) working in collaboration with others to achieve a common goal.

The students' learning objectives consisted of (1) understanding the implications of their design decisions during construction; (2) having a hands-on, active, building experience; (3) learning a new skill set; and (4) working in collaboration with others to achieve a common goal (see exhibit 9).

During the construction period, the houses became nontraditional classrooms used for on-the-job training. Each workday consisted of an early morning team meeting to outline activities, objectives, and participants' roles. On the days when the students were on site, in addition to attending team

[9] Residents expressed a preference for exterior design solutions that were consistent with traditional New Orleans styles and compatible with neighborhood context.

Exhibit 8

Skill Building Helps Teams Perform to Their Capacity

Various training sessions prepared team members to become part of a homebuilding crew. Photo credit: Marsha Cuddeback.

Exhibit 9

Collaboration Achieves a Common Goal

The construction team raises the first wall at 2310 Delery Street, Lower 9 neighborhood, New Orleans. Photo credit: Marsha Cuddeback.

meetings and assisting with the construction, the students were required to document the process through photographs, video, and preconstruction and postconstruction interviews among themselves and with members of the construction team and to write a daily reflection of their experience.

It was important for the project that, as faculty, the authors had flexible schedules that enabled them to respond to problems quickly and to be on site frequently. In addition, to keep the project moving, the authors frequently picked up needed materials at the local supplier to avoid any loss of workers' time on the job. Although it was not anticipated, the onsite participation of the principal investigators was extensive, and it was not unusual for them to be on the project site in the morning and then travel from New Orleans to Baton Rouge to fulfill their instructional obligations, returning to New Orleans at the end of the day to prepare for the jobsite activities the following morning.[10]

Assessment

Assessment, which was an integral component of the demonstration project, began early in the design phase and continued through postconstruction evaluation. February 2008 marked the 1-year anniversary of project completion, at which time the authors conducted a postoccupancy assessment. This was the last remaining piece for inclusion in the authors' forthcoming publication, *Communities Building Community, Recipe for Success*, scheduled for publication in 2009. The sequence of assessments conducted during the project is as follows:

- During the design phase, community members were continuously involved in the design of the houses, and the principal investigators were continuously involved to ensure that codes, standards, and other design issues were carried out properly.
- During the preconstruction period, the project manager administered interviews and assessments to potential community team members.
- During construction training, the construction trainer conducted weekly progress evaluations for each trainee, as well as periodic evaluations for progress on life skills. During this phase of the project, it was apparent that the young men and women from Covenant House were the most vulnerable and unpredictable members of the team. They had the least stable living environment of all the participants and found it challenging to obtain transportation to the site, have access to lunch, and get a good night's sleep. Consequently, after 5 weeks, all trainees from Covenant House had dropped out of the program.
- After the teams completed the construction, students held postconstruction interviews with the Brothers from Bethel Colony South. The Brothers used this work as a starting point for their own construction business, which now produces revenue that participants use for savings and that the ministry uses to assist with financial support.

[10] One of the most difficult barriers to sustaining this service-learning approach is the ongoing and intensive time requirement for the involved faculty. Wiewel, Gaffikin, and Morrissey (2000: 40–41) point out that, in most cases, "the partnership programs of universities appear to be driven mainly by the interests of faculty in research projects or service learning opportunities for their students." They continue: "Housing development like regeneration in general, demands long term intervention. Universities must decide…whether to make a long term commitment," so early and complete buy-in, including necessary resources, is required from the university partner.

The evaluation of the students differed from the evaluation of the construction team. The authors regularly evaluated the students' collaborative working skills and time management skills and issued grades according to the university's schedule. In addition, the students prepared daily reflections on their work, often guided by prompts that the instructor provided to ensure the service-learning aspects of the course were covered. Several quotes from the students' journals are included later in this article. This project had no conflict between its goals and the course outcomes, and, after the students had worked on the site a couple of times, they became fully integrated with the construction team. The student team and construction team worked and learned from each other, exemplifying a true collaboration and the essence of high-quality service learning. The students graduated in May 2008, but it will be several years before they can measure the effect of this experience on their professional lives.

The principal investigators assessed the training team weekly, and they were required to submit weekly progress reports.

Participants' Reflections

Service learning requires that the participants reflect upon their experience as a method for gauging whether the project was successfully implemented.[11] During postconstruction interviews, the Bethel Colony Brothers discussed their expectations for the project and described skills learned, their greatest challenges, and memorable experiences. Many of them were not certain what to expect but were excited to be part of something that was "going to make history." Reflecting on the success of training, Brother James remarked, "I never knew how to read a tape measure but always wanted to learn. Don't know if you believe that or not. And now I know." Brother Kenny, an emerging leader among the team, was initially concerned with the collaborative nature of the project, stating, "(I) always worked and hung by myself. It was a challenge to learn to work with other people, (but) I learned that you can work and learn to respect the other people you work with. I learned people skills in general."

From the teaching and learning perspective, the outcome of this project supports a pedagogical approach that believes students learn best that which they directly experience, critically examine in the context of diverse perspectives, and use in meaningful applications. We believe we achieved this during the fall semester. Postconstruction interviews conducted by our students revealed the following:

> "Coming into the project, the idea of building two houses with a team of unskilled workers seemed very daunting. So much goes into constructing a house that it becomes overwhelming. But as we went along, we only focused on one component of the house at a time. First, we concentrated on the beams, then subfloor, decking, walls, sheathing, ceiling joists, and rafters. We always focused on manageable tasks and completed them. Before I knew it, the houses were completed. This made me realize that I could handle

[11] Although multiple points of view abound concerning reflection in service-learning, it remains a fundamental marker in successful service-learning activities. See Eyler and Giles (1996), Kahne and Westheimer (1996), and Waterman (1997).

> the biggest and most overwhelming of projects. So, on completing this project and this semester, I feel more confident in my abilities and more ambitious to take on anything."[12]
>
> "The greatest learning experience occurred when the first wall was erected. I was able to view a true-to-life, three-dimensional wall section. This specific incident reflected the knowledge of internal structure that I gained throughout the remainder of the time we spent there."[13]
>
> "I learned a lot from this project. I had never used most of the power tools before, and now I can say I know how to use all of them. I also learned about the progression of construction. I realized the general sequence before—floor, walls, roof—but now I know the joints, and I've seen the joints. I can now apply this knowledge to the projects I design. I now know how things are built not just how I want them to look when finished. I would like to learn more ways to prevent hurricane damage. What else can be done to housing/buildings in order for them to withstand catastrophic weather?"[14]

Our students were immersed in the challenges of a post-Hurricane Katrina environment and had untold opportunities to reflect on their professional responsibility to civic engagement. One student summarized her reaction to the physical environment, saying, "I am very sensitive to the aura of a place, so being on Delery Street was overwhelming. The desolation was real and in your face, the isolation was tangible, and the solution so vague and hard to grasp."[15] The students experienced delays in construction, controversy among partners, the effects of consultants unable to perform their contracted work, and the challenges of working with city agencies on the rebound. Running parallel to these challenges, they also experienced the successes of collaboration, the power of perseverance, and the value of diversity, and they witnessed first hand the effect that two small houses had on the psyche of the neighborhood and the effect these houses has in influencing a renewed commitment of neighbors to rebuild and return. One student said, "I think we set the groundwork that they (the community) can continue to build on in the future years. I learned that they are so grateful for even the smallest things. Also, I learned they must have given up hope, because we were the only ones working in the whole area for a long time. I think the fact that we made sacrifices to help them will show them that people do care, and there is a lot of good in this world."[16] To see a photograph of LSU students and Louisiana Delta Corps volunteers posing with Ms. Guice in a nearby lot adjacent to her new home on Delery Street, Lower 9 neighborhood, New Orleans, Louisiana, log onto http://www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html.

Active participation in this project broadened our students' learning in dimensions we are not aware of and typically do not consider in the classroom. Through civic engagement and an active learning environment, the authors believe that students are more likely to have a meaningful learning experience. This belief is borne out in a wider educational context, because postsecondary

[12] Strain, Erik. Postconstruction interview, Louisiana State University, December 14, 2006.

[13] Westcott, Lacey. Postconstruction interview, Louisiana State University, December 15, 2006.

[14] Wotring, Lacey. Postconstruction interview, Louisiana State University, December 15, 2006.

[15] Kennedy, Krista. Postconstruction interview, Louisiana State University, December 15, 2006.

[16] Johnston, Katherine. Postconstruction interview, Louisiana State University, December 15, 2006.

education, as a whole, continues rethinking strategies for student learning. In particular, when considering those learning environments and educational experiences that help students achieve their educational goals, educators are recognizing that transmission of knowledge and skills alone are no longer sufficient to prepare students to effectively respond to the complex challenges they will face at work, in the community, and in their personal lives. The decisions educators make profoundly influence graduates' expectations of the workplace and their ability to understand and connect with real-world issues. American educator Ernest Boyer and his co-author Lee Mitgang (1996) suggest the following in their comprehensive study of architecture education and practice:

> "The essential purpose of architecture education, then, is not only basic training of beginning practitioners, but also the initiation of students into this [the architect's] common legacy of knowledge, skills and language, while instilling a sense of connectedness to the human needs that architecture, as a profession, must continually address. Architecture education, if it is to fulfill those ends, must celebrate and support, and also challenge, the profession and society as a whole" (Boyer and Mitgang, 1996: 4).

Conclusion

Much attention has been focused on the prototype houses and, although the houses are important, they are a desirable byproduct of the project's central goal to train community members to build houses. The project was truly about demonstrating that training people from the community to build houses could promote sustainable neighborhoods and, by using a service-learning approach, the project would simultaneously broaden the learning experience of our students. The authors doubt that there will be a massive external effort to rebuild houses on Delery Street. No continuing funding exists to support the training program, and political support for continuing the project was missing, as frequently happens with grassroots efforts. Regardless of what the future holds for Delery Street, the demonstration project leaves lasting learning points, including the following:

1. The prototype strategy will work, given adequate funding for training and tools.
2. Everyone involved with the production of affordable housing must understand that the market for affordable housing in New Orleans differs fundamentally from "standard practice." Homeowners have money to rebuild, so providing mortgage financing at the time the project is complete is less risky and consequently the pool is larger. Faced with severe financial difficulties from the ongoing subprime mortgage situation, however, the current availability of permanent financing for affordable housing will be even more difficult to procure unless appropriate steps are taken to maintain an available pool of mortgage funds from outside the capital markets.
3. Construction financing must take into account the processes and procedures for receiving funding from the Louisiana Recovery Authority and FEMA, and lenders must be willing to work with guarantees and potential delays.
4. The houses constructed as a result of the training must include only a fair cost for labor. Training funds must cover the difference between actual cost for training wages and the ultimate return for wages from the sale of the home.

5. The training program must be self-sustaining. In other words, it must produce trainers so the program can be expanded and free up graduates to enter the marketplace in suitable construction positions.
6. The rebuilding effort will be lengthy and require constant community involvement to be successful.

The common goal is to see the neighborhoods in the Lower 9th reconstructed, block by block, with the revenue generated from the process returned to the community. As the houses are built, so is the community, and with resources flowing back into the local economy rather than out of state, the community becomes self-sufficient, men and women are trained in the construction trades, and the neighborhoods are rebuilt.

In their reflections on the project, the students phrased it differently, but in the same spirit:

"…new housing needs to develop in order for people to return and businesses need to return in order to provide jobs for the residents. It's a chain effect, and both these problems need to be addressed in order for change to occur. By building these houses, we have started the 'chain,' and that is a huge accomplishment. If the chain continues, the Lower 9 will become a thriving community."[17]

Next Steps

Although this project was filled with challenges for all the partners, it was completed and we learned how to make the process work successfully. A manual for replicating the process will be published in 2008. Our greatest disappointment was the lack of resources to continue with the next two construction cycles so that the trainees would be ready to work independently. The funds were not available, however, it is here that the universities can lend support by working closely and over the long term with communities to develop and augment the necessary resources to ensure that community members receive the appropriate training to develop the capacity to rebuild their communities.

Afterword

On September 25, 2007—13 months after Hurricane Katrina made landfall and forced people out of the neighborhood—construction began on the first two new homes in the Lower 9 neighborhood of the Ninth Ward. Five months after construction commenced, as a crowd gathered for the grand opening of the homes, the sounds and sights of demolition continued in the neighborhood. The demolition crews were hard at work removing the remaining destroyed houses and carting away the debris. Seen first hand, this work is quite a feat of choreography: workers and machines systematically crushing the damaged houses and removing the debris bucket by bucket. Unfortunately, crushed building material is not all they take with them. The memories of the place are attached to the debris and, as each lot is swept clean, the remembrances of the neighborhood fade farther into the distance. As the demolition crews pack up and move to another house to be razed, they do so with seemingly no reason to their pattern of destruction. Adjacent houses were left

[17] Johnston, Katherine. Postconstruction interview, Louisiana State University, December 15, 2006.

standing only to be removed 2 or 3 weeks later, and as the houses disappeared, so did the memories of place, leaving only an overwhelming sense of desolation. That was the reality of the Lower 9 neighborhood. But things have changed since then. The neighborhood is awakening among the empty lots and broken houses: a harsh reminder of the extraordinary losses that occurred. Hope continues. In addition to the two pioneer homeowners who own the new houses, others are renovating, repairing, and planning to return.

The Office of Community Design and Development

The Office of Community Design and Development (OCDD) is a university-based interdisciplinary community outreach center that connects students with Louisiana's communities to help improve the quality of our built environment and the lives of citizens across our state, and beyond. Collaboration, active learning, and civic engagement are central to the working philosophy of OCDD. All project work relies on teams composed of clients, community stakeholders, students, and faculty to ensure successful outcomes for the community while meeting educational goals. OCDD operates a permanent teaching and learning laboratory throughout the year in Atkinson Hall on Louisiana State University's campus. Here, students are presented with the social, economic, and political realities of practicing architecture in the public realm; given opportunities to apply their learning to real-life problems; and develop collaboration skills that meet the demands of contemporary practice in an increasingly global environment. OCDD is fully integrated in the curriculum and provides the structure for service-learning projects introduced in the fourth year design studio. As a result, OCDD has contributed to the educational experience of every student in the School of Architecture's undergraduate professional degree program since academic year 2000–01.

OCDD offers employment opportunities, graduate assistantships, and internships for students majoring in architecture, interior design, landscape architecture, graphic design, disaster management, business, and other related disciplines engaged in community design and development; supervises students completing a minor in community design; provides professional practice resources and technical assistance; maintains a Sustainable Materials Library; and offers grant-writing assistance for student-initiated service-learning activities and projects.

Established in 1999, OCDD is the outreach arm of the School of Architecture, bridging the academy with practice, and is funded through grants and sponsored research. Since opening, OCDD has served more than 50 communities and organizations in Louisiana and Mississippi, employed more than 200 students and interns, developed more than $1.7 million in sponsored research, and authored numerous publications and technical reports.

Acknowledgments

The authors thank the homeowners, project team, and participants who made this project possible, including Louisiana State University students Loren Brouillette, Jared De Jonge, Blake Duplant, Katherine Johnston, Krista Kennedy, Reneau Londot, Lauren Miller, Marcelle Robards, Erik Strain, Lacey Westcott, and Lacey Wotring and the Brothers from Bethel Colony South under the leadership of Pastor Melvin Jones.

Authors

Marsha R. Cuddeback is director of the Office of Community Design and Development in the School of Architecture, Louisiana State University.

Frank M. Bosworth is a professor of architecture in the School of Architecture, Louisiana State University.

References

Achtenberg, Emily, and Peter Marcuse. 1986. "The Causes of the Housing Problem." In *Critical Perspectives in Housing,* edited by Rachel G. Bratt, Chester Hartman, and Ann Meyerson. Philadelphia: Temple University Press: 4–11.

Arefi, Mahyar. 2004. "Neighborhood Jump-Starting: Los Angeles Neighborhood Initiative," *Cityscape: A Journal of Policy Development and Research* 7 (1): 5–22.

Boyer, Ernest, and Lee Mitgang. 1996. *Building Community: A New Future for Architecture Education and Practice*. Princeton, NJ: Carnegie Foundation.

Day, Dianne. 1997. "Citizen Participation in the Planning Process: An Essentially Contested Concept?" *Journal of Planning Literature* 11 (3): 421–434.

Eade, Deborah. 1997. *Community-Building: An Approach to People Centered Development*. United Kingdom and Ireland: Oxfam.

Eyler, Janet, and Dwight Giles, Jr. 1996. *A Practitioner's Guide to Reflection in Service-learning: Student Voices & Reflections.* Nashville: Vanderbilt.

Fagan, Barbara. 2006. *Designing Public Consensus: The Civic Theater of Community Participation for Architects, Landscape Architects, Planners, and Urban Designer*. Hoboken, NJ: Wiley.

Fainstein, Susan S. 2000. "New Directions in Planning Theory," *Urban Affairs Review* 35 (4): 451–478.

Gautreau, Chris. 2008. "LRA To Run Cottage Program," *The Advocate* (Baton Rouge), March 1, 1D.

Glass, James J. 1979. "Citizen Participation in Planning: The Relationship between Objectives and Techniques," *Journal of the American Planning Association* 45 (2): 180–189.

Greater New Orleans Community Data Center. 2002. "Lower Ninth Ward Neighborhood." Greater New Orleans Nonprofit Knowledge Works. http://www.gnocdc.org/orleans/8/22/index.html (accessed February 22, 2007).

Greenwood, Davydd, William Whyte, and Ira Harkavy. 1993. "Participatory Action Research as a Process and as Goal," *Human Relations* 46 (2): 175–192.

Innes, Judith. 1995. "Planning Theory's Emerging Paradigm: Communicative Action and Interactive Practice," *Journal of Planning Education and Research* 14 (3): 183–189.

Kahne, Joseph, and Joel Westheimer. 1996. "In Service of What? The Politics of Service Learning," *Phi Delta Kappan* 77: 593–599.

Kumar, Somesh. 2002. *Methods for Community Participation: A Complete Guide for Practitioners*. Warwickshire, United Kingdom: Practical Action Publishing.

New Orleans Public Library. 1949. *From Jackson Barracks to St. Maurice Street* and *From Delery Street to Alabo Street.* New Orleans Public Library, Louisiana Division, City Archives Collection: Municipal Government Collection, City Agencies, aerial photographs of New Orleans, Set C, 38–39.

Sanoff, Henry. 1999. *Community Participation: Methods in Design and Planning.* New York: Wiley-Academy.

Shields, Gerard. 2008. "Storm Recovery Czar Will Be Stepping Down," *The Advocate* (Baton Rouge), March 1, 1A.

Waterman, Alan. 1997. *Service-learning: Applications from the Research*. Mahwah, NJ: Lawrence Erlbaum.

Wiewel, Wim, Frank Gaffikin, and Michael Morrissey. 2000. "Community-University Partnerships for Affordable Housing," *Cityscape: A Journal of Policy Development and Research* 5 (1): 27–45.

Williams, Leslie. 2008. "Trailer Residents To Be Moved Into Apartments and Hotels," *The Times-Picayune* (New Orleans), February 14.

Work Projects Administration (WPA). 1940. *Paving Delery Street, WPA workmen constructing gutters on Delery Street near the entrance to Jackson Barracks* (Photograph 33.41). New Orleans Public Library, Louisiana Division, WPA Photograph Collection: 5/15/1940, Photo 1.

Additional Reading

The following salient works are related to service learning and educational pedagogy.

Astin, Alexander, and Linda J. Sax. 1998. "How Undergraduates Are Affected by Service Participation," *Journal of College Student Development* 39 (3): 251–63.

Benson, Lee, Ira Harkavy, and John Puckett. 1996. "Communal Participatory Action Research as a Strategy for Improving Universities and the Social Sciences: Penn's Work with the West Philadelphia Improvement Corps as a Case Study," *Educational Policy* 10 (2): 202–222.

Bringle, Robert, and Julie Hatcher. 1996. "Implementing Service Learning in Higher Education," *Journal of Higher Education* 67 (2): 221–239.

Checkoway, Barry. 1997. "Reinventing the Research University for Public Service," *Journal of Planning Literature* 11 (3): 307–319.

Eyler, Janet, Dwight Giles, Jr., and John Braxton. 1997. "The Impact of Service-Learning on College Students," *Michigan Journal of Community Service Learning* 4: 5–15.

Furco, Andrew. 1996. "Service-Learning: A Balanced Approach to Experiential Education." In *Expanding Boundaries: Serving and Learning*, edited by Barbara Taylor. Washington, DC: Corporation for National Service: 2–6.

Harkavy, Ira, and Lee Benson. 1998. "De-Platonizing and Democratizing Education as the Bases of Service Learning," *New Directions for Teaching and Learning* 73: 11–20.

Harkavy, Ira, John Puckett, and Dan Romer. 2000. "Action Research: Bridging Service and Research," *Michigan Journal of Community Service Learning, Special Issue* (Fall): 113–118.

Harkavy, Ira, and Wim Wiewel. 1995. "University-Community Partnerships: Current State and Future Issues," *Metropolitan Universities: An International Forum* 6 (3): 7–14.

Howard, Jeffrey. 1998. "Academic Service Learning: A Counternormative Pedagogy," *New Directions for Teaching and Learning* 73: 21–29.

Varlotta, Lori E. 1997. "Confronting Consensus: Investigating the Philosophies That Have Informed Service-Learning's Communities," *Educational Theory* 47 (4): 453–476.

A Sustainable Housing Response to Hurricane Katrina

John Quale
Kristina L. Iverson
University of Virginia

Abstract

This article describes the collaborative experience of the ecoMOD project at the University of Virginia (UVA) and Habitat for Humanity® International as they developed a prototypical ecological, prefabricated, and affordable home for a family along the Gulf Coast of Mississippi after Hurricane Katrina made landfall in August 2005. Since 2004, ecoMOD has created five affordable housing units, four of them in Charlottesville, Virginia. The project is a partnership of the UVA School of Architecture and the School of Engineering and Applied Science. The project's aim is to create well-designed, high-quality homes that minimize living costs and environmental impact.

Introduction

To date, ecologically sustainable homes have been mostly reserved for the wealthy. Yet the health concerns associated with indoor air quality and the financial burden of unnecessarily inflated utility costs point to the need for homes that are both environmentally responsive and affordable for low-income people. With more than 200,000 homes destroyed by hurricanes in 2005 (Cashell and Labonte, 2005), the Gulf Coast is in the midst of a long rebuilding effort. Hurricane Katrina alone is the single most destructive and costliest natural disaster in U.S. history. To address the resulting building crisis, in early 2006 the ecoMOD design/build/evaluate project at the University of Virginia (UVA) expanded its scope to partner with Habitat for Humanity® International (HFHI, or Habitat) in the devastated Gulf Coast region of Mississippi. Originally focused exclusively on housing for central Virginia, the ecoMOD project accepted an invitation to provide a home for Habitat's Operation Home Delivery program with Habitat for Humanity of Greater Charlottesville (HFHGC). HFHGC sent five conventional panelized homes to Habitat for Humanity of the Mississippi Gulf Coast (HFHMGC), and the ecoMOD2 team designed and built one of these. HFHGC shipped ecoMOD2, the preHAB house, as a flat-pack panelized home using an innovative super-insulated

steel and foam panel system instead of a conventional wood stud frame. They installed the preHAB house in an established neighborhood in Gautier, Mississippi, for a family displaced by Hurricane Katrina (see exhibit 1). The site is a 1960s affordable housing subdivision just north of the area flooded by the initial deluge of Hurricane Katrina. Although several houses in the subdivision were significantly damaged, the part of Gautier that was essentially "erased" is 2 miles south—directly on the coast. Installing this particular house provided an opportunity for the design team to test and investigate contemporary design, environmentally responsible strategies, and prefabricated construction within the constraints and mission of HFHI.

Prefabrication can be a cost-effective method of construction, and highly energy-efficient homes have lower utility costs, making sustainability and prefabrication an ideal combination for affordable housing (USGBC, 2007). Currently, however, prefabricated homes are seldom designed for energy efficiency, and most environmentally sustainable homes are expensive to build. The design team used prefabrication to test the cost-effective strategy and raised money to subsidize material and equipment donations. To align with HFHI's mission,[1] local and university volunteers completed all the labor. In addition, the team is currently evaluating the home's energy efficiency through monitoring systems and monthly energy savings models. The 1,087-square-foot, three-bedroom home was built for approximately $65 per square foot.

Exhibit 1

The ecoMOD2, preHAB House in Gautier, Mississippi

Student rendering of ecoMOD2, the preHAB house, which is an affordable, ecologically sound, prefabricated home constructed in Gautier, Mississippi.

[1] "Habitat for Humanity International is a nonprofit, ecumenical Christian housing ministry. HFHI seeks to eliminate poverty housing and homelessness from the world, and to make decent shelter a matter of conscience and action" (HFHI, 2008). According to Habitat for Humanity, the organization strives to produce decent housing nationally and internationally; in the United States, the price of a typical Habitat house averages $60,000 (after subsidies). HFHI operates out of Americus, Georgia.

Ultimately, the research team noted two major observations about the ability to translate the ecoMOD2 project into other similar situations. First and foremost, a region responding to a natural disaster and housing crisis is a good testing ground for alternative methods of providing housing, but working in such areas requires much patience and flexibility. Secondly, the idea of sustainable, prefabricated housing is compatible with the mission of HFHI; however, making this idea a reality on a widespread basis will require retraining Habitat staff and volunteers.

Educational Objectives

Of the several possible ways to simultaneously address social equity and sustainability in a university design program, the two most common are design/build projects, which offer a direct response to a specific community need, and speculative design research projects, which seek to have a broader (albeit more abstract) effect. This research team aimed to blend the best of these worlds to achieve results that are both tangible and forward thinking. The project, which is embedded within the university's curriculum, is intended to create well-built homes that cost less to live in, minimize damage to the environment, and appreciate in value.

The normal cycle of the project includes an academic year for design and construction, followed by an academic year of evaluation. For ecoMOD2, however, it was necessary to significantly reduce the cycle to 14 weeks for design, overlapping with approximately 6 broken-up weeks for the UVA students to construct the home and several intermittent weeks for Habitat volunteers in Mississippi to complete the home. The goal of the design phase is to foster integrated and interdisciplinary collaboration throughout. The process is iterative and multifaceted. To mimic factory production, each ecoMOD prototype is fabricated at a decommissioned airfield hangar owned by UVA and shipped either as modules or panels to its final destination. Because of the great distance between Virginia and Mississippi, the team decided to ship panels rather than modules. The evaluation phase is built on emerging strategies and protocols for the analysis of a completed building. Each evaluation process may include analysis into the environmental impact of the systems and materials, energy performance, affordability, human comfort, constructability, and thoughtful placement within a community.

Interdisciplinary Process

The ecoMOD Project is multidisciplinary and involves undergraduate and graduate students from various programs in the UVA School of Architecture and School of Engineering and Applied Science. The participants are required to synthesize complex information and effectively collaborate to make decisions. The collaboration is simultaneously intradisciplinary and interdisciplinary, which makes the challenge that much more difficult. Students and faculty are forced to learn each other's language and to collectively reach conclusions. Often, solutions that are obvious for one discipline are not as clear to others. By strategically bringing so many disciplines together, the end results are typically richer and more thoroughly studied. By definition, the design was not from the mind of a single person but was the coordinated effort of many.

During the project, the students learn sustainable design and environmental principles—and then immediately apply them. They apply these principles with a real budget, site, and client. And to

take this learning approach a step further, the faculty analyzes and monitors the home throughout the project. This kind of critical feedback loop is unusual in architecture and engineering education (and the professional world) and is what distinguishes this project from many others.

All the ecoMOD design teams use "decision webs" to facilitate the decisionmaking process. The webs are a graphic device to help track thought processes and recognize the complex array of issues affected by each decision. The ecoMOD2 design team did not always agree, and decisions occasionally became compromises. Yet they were constantly aware of the potential danger of watering down good ideas by choosing the strategy that most people could agree on. Finding just the right balance between productive collaboration and "design by committee" is a continuous concern for all ecoMOD projects.

The ecoMOD2 team also works with outside advisors, which, depending on the project, might include architects, engineers, contractors, fabricators, subcontractors, prefabrication experts, landscape architects, affordable housing developers, housing counselors, planners, historic preservationists, environmental scientists, building department officials, business people, and sustainability experts on daylighting, material selection, indoor air quality, energy efficiency, and renewable energy.

Educating the Public

The ecoMOD2 team designed the preHAB home in Gautier with an emphasis on natural ventilation, thermal efficiency, and cost-savings strategies for materials, including the use of reclaimed materials from buildings destroyed in the hurricane. Team members also designed it to meet the U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED)™ for Homes standard (USGBC, 2007); however, the $3,000 cost of participating in the pilot phase of the project, together with the scheduling of the design and construction, kept the team from registering the project with the USGBC. LEED for Homes is partly based on the nationally recognized LEED for New Construction standard, which has become the most widely adopted green building program in the United States. One of the two housing units at ecoMOD3, completed in Charlottesville, Virginia, after ecoMOD2, is registered with LEED for Homes, with the goal of achieving a gold- or platinum-level certification in 2008. Because LEED for Homes has now ended its pilot phase, the cost of registration and certification has decreased significantly.

Through the use of sustainable design, materials, and technologies, this home will educate homeowners, builders, and architects in the region and provide support for developing sustainable goods and services by increasing the market for these products. By designing to demonstrate adaptable and hurricane-resilient housing using precautionary principles, this demonstration effort can potentially mitigate the creation of building debris and the complete loss of habitation in future disaster recoveries. As part of an effort to communicate the potential of the design, the regional media featured ecoMOD2 three times on local Gulf Coast television stations, at least once in a local newspaper, and a few times on Gulf Coast websites. An exhibit of Gulf Coast rebuilding efforts that traveled throughout the region featured ecoMOD2. The project also was shown in New York City.

"Sweat Equity"

Part of Habitat's mission is to find future residents who are willing to put "sweat equity" into building their own homes. Typically HFHI affiliates use conventional wood framing or stick-built strategies with a large and often inexperienced volunteer workforce. Future homeowners and other short-term volunteers show up for "build days" to assemble materials that are already prepared for them by full-time Habitat staff or volunteers. The volunteer-based construction process not only leads to the completion of a home, but it is also an essential part of Habitat's mission to raise money and public awareness. HFHI officials see the value in the dramatic scene of a crowd of volunteers hammering walls together to energize the community and maximize fundraising. The future homeowners are usually required to put some "sweat equity" into their home or another home, and, although they purchase the home, the price is significantly lower than its actual cost or appraised value.

The ecoMOD2 team partnered with HFHI and many of its affiliates, including HFHGC and HFHMGC. Through this partnership the team was able to demonstrate for itself and local citizens value-added construction techniques[2] using sustainable and reclaimed materials. The benefit of partnering with HFHI was not only the invaluable education and skills students and volunteers acquired but also the ability to lower overall production costs. The prefabrication occurred more than 900 miles from the final site of the house, so the challenge of responding to onsite issues was a difficult one. Because the team could not permanently oversee construction during the full period, onsite time was valuable; and because site visits were extremely limited, the amount of onsite time became a critical concern.

Guiding Principles and Design Goals

The team strived to create a house that is adjustable to the climate of southern Mississippi. Contained, exterior spaces are an integral element of the design, expanding the apparent size of the house, while simultaneously helping to passively cool it. The team's goal was for the family to be able to turn off the air conditioning during all but the very hottest days of the year—something that is highly unusual today in that part of Mississippi. The house incorporates a photovoltaic solar panel array that provides domestic hot water for laundry, bathing, dishwashing, and cooking and a heat pump/heat recovery system for heating and air conditioning. With the photovoltaic array in place (a "gift" to the family from funding secured by the UVA team) and the air conditioning turned off, the home could possibly operate without electricity from the regional electrical grid. Unfortunately, Mississippi is not a net metering state, so the homeowners will not be able to "bank" any excess capacity for future needs.

The design team followed the strict Habitat requirement to create a three-bedroom home no larger than 1,100 square feet. Although the home is just 1,087 square feet, ecoMOD2 appears to be almost 2,100 square feet because of four distinct spaces—in the form of covered porches and outdoor spaces—brought into the perimeter of the building. Each of these four spaces serves a

[2] *Value-added construction* is a commonly used term referring to design and construction decisions that affect the thermal envelope, energy, and water efficiency of the building. The intent is to limit air leakage and inefficient use of materials.

unique purpose: entry, screened-in outdoor dining, private terrace, and covered storage area to substitute for a garage that Habitat does not typically provide. The south-facing outdoor spaces and the windows on the east and west façades were meant to incorporate shade devices that are able to both protect the home from harsh sunlight and adapt to become hurricane-protection devices. Unfortunately, only some of these screens were installed because new wind-load requirements established after Hurricane Katrina made it difficult for the team to appropriately document the capacity of these elements. All the windows and doors are carefully placed to balance the need for daylight, natural ventilation, and privacy. The single shed roof with the high point facing the north also encourages natural ventilation. The north-facing windows are high on the wall to facilitate stack effect and cross ventilation.

The design can be prefabricated as panels, room-sized modules, or components, or as any combination of all three. The prototype house is built from an innovative steel and foam panel system (ThermaSteel™ Corporation of Radford, Virginia),[3] which is highly insulated and resists hurricane-force winds and mold. The ecoMOD2 team convinced ThermaSteel to sell its leftover panels for a significantly reduced cost—less than wood-stud framing. Typically, ThermaSteel engineers and prefabricates the panels to fit each project. Purchasing the "remainders," however, meant the team had to cut and reassemble the wall panels into the correct configuration for the preHAB design. Because the exterior spaces are partly covered by the roof, it was necessary to ensure the hurricane-proof structural performance of the exposed roof areas, so the ecoMOD2 team had ThermaSteel make custom panels for the roof. All the panels for the house were shipped on a flatbed truck to the empty lot in Gautier.

The design is also intended to demonstrate the potential of prefab for Habitat affiliates. HFHI was already pursuing panelized construction with its "Operation Home Delivery" project, focused on delivering wall panels from around the country to be set up in the hurricane-devastated Gulf Coast region. Unfortunately, the scale of the disaster meant that the process was not very well organized and that some homes that HFHI received could not easily be assembled as intended. The team heard of a few situations in which the prefabricated frame walls and roofs were disassembled so the lumber could be used for other homes.

The goal of the preHAB design is to take this strategy one step further by developing a home that can be prefabricated in various ways. With this project we imagine future disaster relief efforts in which HFHI affiliates from across the United States could enlist their volunteers to build house panels, modules, or components without taking too much time or money away from the local Habitat affiliates' own local building efforts. The perception among Habitat officials is that prefab construction conflicts with HFHI's local volunteer labor strategies. Yet, with a carefully designed prefab house system, HFHI affiliates from across the country could also contribute to very worthy relief efforts outside their own area. By offering a range of opportunities based on level of involvement, this prototype house strategy could include the efforts of smaller HFHI affiliates that do not

[3] ThermaSteel Corporation builds thermal steel panels that are ENERGY STAR® compliant and made from recyclable materials. The panels comply with the Department of Energy's Model Energy Code and have passed Florida's Hurricane Test Lab. The panels contain framing, insulation, sheathing, and vapor barrier and they can be premolded (ThermaSteel Corporation, 2008).

have the resources to ship a complete home to a disaster area. For instance, in the context of Hurricane Katrina, HFHI affiliates in the states adjoining Mississippi and Louisiana could contribute modules. HFHI affiliates within 500 miles could produce wall and roof panels, and others could ship smaller and simpler components.

After setting the walls and roof of the house (see exhibit 2), HFHMGC, with assistance from a Habitat group from Connecticut, completed the interior and exterior finishes. Unexpected complications with the construction, together with a skilled labor shortage in the region (plumbers and electricians, in particular), delayed the completion of the house, which was not finished until the summer of 2007 (see exhibit 3). The local affiliate received a lot of interest in the house from potential residents, and, near the end of the summer of 2007, HFHMGC selected a family. The birth of a new child in the family competed for the funds they were trying to save for the 1-year insurance escrow they needed to close on the purchase of the house. Eventually the family moved in during the summer of 2008.

Exhibit 2

Construction of the preHAB House in Gautier, Mississippi

Students begin to set up the modular panels of the preHAB house in Gautier, Mississippi.

Exhibit 3

Partners Construct Panelized Home in Gautier, Mississippi

The interdisciplinary university team partnered with Habitat for Humanity International to construct this 1,087-square-foot panelized home, which was completed in Gautier, Mississippi, during the summer of 2007.

Evaluation Process

Although many residential projects claim to be environmentally responsible, few attempt to carefully analyze the environmental impact or efficiency of the final product. The ecoMOD project is structured to monitor and analyze each completed prototypical housing unit. The evaluation phase of the project is essential, because, as an educational project, the goal is to build both confidence and humility in students. The ecoMOD evaluation teams typically assess the environmental impact, efficiency, affordability, occupant's satisfaction, and production readiness of each housing unit. The monitoring systems designed by the ecoMOD engineering teams measure indoor and outdoor air temperature; relative humidity; carbon dioxide levels; and electricity, gas, and water usage (see exhibit 4).

Given the distance between UVA and the site in Mississippi, together with the lack of funding to support travel, the evaluation phase for ecoMOD2 has been cut back and is limited to post-occupancy evaluations, a brief material assessment, and partial building monitoring during the first year of occupation. The monitoring includes electrical, gas, and water usage to analyze energy efficiency and measure cost-effectiveness. The team will compare this information to its digital design simulations that predicted those outcomes. Information gathered will help in developing future houses and in communicating the benefits of careful design and construction to future potential homeowners.

Exhibit 4

Prefabricated House With Energy Monitoring System in Gautier, Mississippi

This prefabricated house in Gautier, Mississippi, includes a digital energy monitoring system that the university engineering team designed. The system collects data to chart electrical, gas, and water usage throughout the year.

Conclusion

The extreme nature of the Hurricane Katrina disaster is the biggest challenge facing the Gulf Coast's rebuilding effort. The National Low Income Housing Coalition[4] estimates that 71 percent of the destroyed units in the affected areas were in the affordable to low- and very low-income household categories. According to the Congressional Budget Office, the recovery process from Hurricane Katrina will take longer than normal because workers associated with the effort have no place to live. According to the Brookings Institution,[5] median house prices in New Orleans have increased since Hurricane Katrina occurred and the limited supply of housing is pushing up ownership and rental prices to the extent that entry-level homeowners and other working families may have difficulty finding affordable housing if and when they return. The commonly held expectation that the city may reach only 60 percent of its pre-Hurricane Katrina population over the next several years is very possible if affordable housing is not available. Clearly in this scenario the Gulf

[4] The National Low Income Housing Coalition, based in Washington, D.C., is an organization whose focus is to create more affordable housing. The data suggested in this document are from NLIHC (2007).

[5] The Brookings Institution, based in Washington, D.C., is a nonprofit public policy organization whose mission is to produce independent, high-quality research to influence and direct democracy, economic and social welfare, and a safe and prosperous international system.

Coast will shrink in its economic capacity, tax revenues, and ability to maintain housing stock that is no longer habitable or is in areas that are truly at grave risk and uninsurable. These data confirm that affordable housing is a necessity and the Gulf Coast is in desperate need.

Initially, inadequate support and infrastructure directly affected the rebuilding efforts. Existing local Habitat affiliates were typically producing two homes per year in this region before the hurricane. Post-Hurricane Katrina homebuilding numbers have increased to an average of 200 homes per year for the Gulf Coast of Mississippi and Louisiana. The initial lack of infrastructure to support such a large rebuilding effort proved to be a very significant challenge. In the end, HFHI assumed many of the responsibilities typically reserved for local affiliates and provided a major influx of cash from its donations. HFHI also combined county-based Habitat affiliates into the more robust regional HFHMGC. When the ecoMOD2 team first arrived in Mississippi less than 6 months after Hurricane Katrina made landfall, both the local Habitat affiliate and the local building department were operating with a small staff and only starting to make headway toward an organized response to the situation. What was a patched-together operation has turned into a much more organized and effective team of Habitat professionals leading their efforts.

The difficulties of taking on the ecoMOD2 preHAB prototype in this context were significant. At the time, HFHI was having difficulty completing conventional wood framing structures like the ones they have built all over the country. Asking them to help build the ecoMOD2 preHAB design required them to adapt to a very different design and a very different type of structure. The collaborative team learned that if ecoMOD participates in another disaster relief effort, it is important to completely solve all issues before shipping to the site so that the onsite construction can be completed on time. In addition, the team should have assumed each phase would take at least twice as long to complete than it would under normal circumstances.

Regarding the design itself, the success will have to be measured—both in terms of the performance of the home and the occupant's satisfaction. The team already knows, however, that if ecoMOD builds again from this design, it should simplify the design somewhat to make sure that any Habitat team can easily complete it. Unfortunately, changes had to be made to the home in the middle of construction because the local Habitat teams did not understand the design intentions. A complete set of construction drawings were available inside the house, but one group misunderstood an exterior open skylight in the outdoor dining area and a bay window in the kitchen and mistakenly removed them both. These elements would have enhanced the livability of the home considerably. In addition, the ecoMOD team should have prepared a clearer list of locally available and acceptable materials to be appended to the construction drawings, to allow for last-minute substitutions. For example, all the ecoMOD teams typically try to avoid PVC/vinyl products, due to the toxic nature of their production and their recycling challenges. But the local Habitat builders ignored the reference to a commonly available aluminum eave and window trim when they found there would be a slight delay in receiving it, and they installed vinyl instead. Also, most of the old growth cypress wood reclaimed (with permission) from destroyed buildings in nearby Bay St. Louis was not assembled into the front entry deck and outdoor dining deck as planned because the local Habitat workers did not have the right equipment. In addition, the local workers left the wood on the ground for an extended period of time—where it turned into a breeding ground for insects. What would have been a beautiful deck of free material had to be replaced with concrete.

Of far less importance, but notable nonetheless, is the unnecessary addition of conventional interior trim at cabinetry edges and door openings. The design team had labored to create simple clean details, but, when leaving town, they failed to put large notes on the trimless details, alerting the local workers that nothing more was required.

In this sense, the completed home is less than what the team intended, but these lessons are important ones. With the projects built in Charlottesville, the teams have complete control over the construction efforts; but, even with ecoMOD1 and ecoMOD3, the final buildings could have been simplified. Recognizing and acknowledging these problems are an important part of refining the ecoMOD design process.

The University of Virginia Patent Foundation has registered the copyrights for the drawings of all the completed homes, including ecoMOD2. The Patent Foundation has also licensed the designs to a modular marketing company to make them available to modular builders, individuals, and affordable housing organizations—although this process is in the early stages. In addition to commercializing the designs, the ecoMOD engineering team intends to commercialize the ecoMOD wireless monitoring system. They plan to make it available to affordable housing organizations and individuals, so others can get easily understandable feedback on their energy and water usage and on the performance of their homes.

By taking the ecoMOD designs into production, we intend to give affordable housing organizations quick, low-cost, and sustainable infill housing options that cost less to operate. Estimates from modular builders show the prototypes can be replicated at a lower cost than standard site-built housing. We do not have clear evidence, however, that the scale of this savings is the same in the context of the heavily subsidized and donation-dependent world of HFHI construction. Further research into this matter is difficult, given the challenges of tracking hard costs with a single Habitat home, but it is an important question for the viability of the preHAB design. In the end, what can be definitively stated is that a team of architecture and engineering students learned a lot about sustainability, prefabrication, and disaster relief housing, HFHI staff and volunteers were exposed to more sustainable methods of design and construction, and a family lives in a home that will cost less to operate than the one next door. Perhaps that is enough for now.

Acknowledgments

The authors thank Habitat for Humanity of the Mississippi Gulf Coast, Habitat for Humanity of Greater Charlottesville, Habitat for Humanity International, and the various sponsors for and team members of ecoMOD2.

Authors

John Quale, LEED AP, is assistant professor in the School of Architecture at the University of Virginia and is the ecoMOD project director.

Kristina L. Iverson received a post-professional master of architecture at the University of Virginia and served as a research assistant on the ecoMOD Project.

References

Cashell, Brian W., and Marc Labonte. 2005. *The Macroeconomic Effects of Hurricane Katrina*. CRS Report for Congress. Washington, DC: Library of Congress, Congressional Research Service, Government and Finance Division.

Habitat for Humanity International (HFHI). 2008. Habitat for Humanity Fact Sheet. http://www.habitat.org/how/factsheet.aspx.

National Low Income Housing Corporation (NLIHC). 2007. "Gulf Coast Housing Advocates Gear Up for 'Week of Action' on the Many Unmet Housing Needs Since 2005 Hurricanes." Press release. Washington, DC: National Low Income Housing Corporation. http://www.nlihc.org.

ThermaSteel Corporation. 2008. ThermaSteel Corporation website. http://www.thermasteelcorp.com.

U.S. Green Building Council (USGBC). 2007. The Green Home Guide. http://www.greenhomeguide.org.

Working With Experience

David Perkes
Gulf Coast Community Design Studio and Mississippi State University

Christine Gaspar
Gulf Coast Community Design Studio

Abstract

This article addresses the work of Mississippi State University's Gulf Coast Community Design Studio to help families in Biloxi, Mississippi, after Hurricane Katrina damaged homes in the city. The article argues that specialized knowledge of planning, design, or construction is less important than the ability to engage and understand the cultural background and interests of a community. Such experience*, as opposed to* expertise*, facilitates effective communication and cooperation among all stakeholders and helps to best improve the community's ability to recover and rebuild.*

Introduction

The life of community design is not expertise; it is experience. This statement does not mean that expertise is not an important part of community design; it means that expertise is not the motivation that shapes and sustains a community design practice. Although both expertise and experience can be used to describe acquired skills, considering the difference between the two words is instructive.

Expertise describes uncommon skills or specialized abilities that set one person or a group of people apart from others. *Experience*, on the other hand, describes a quality of skill and knowledge that comes from commonly shared events or phenomena and that forms and strengthens human relationships around those phenomena. In its inclusive sense, experience is everything that comes from the interaction of the human organism with its environment: beliefs, customs, values, politics, and prejudices; in short, another name for culture.[1]

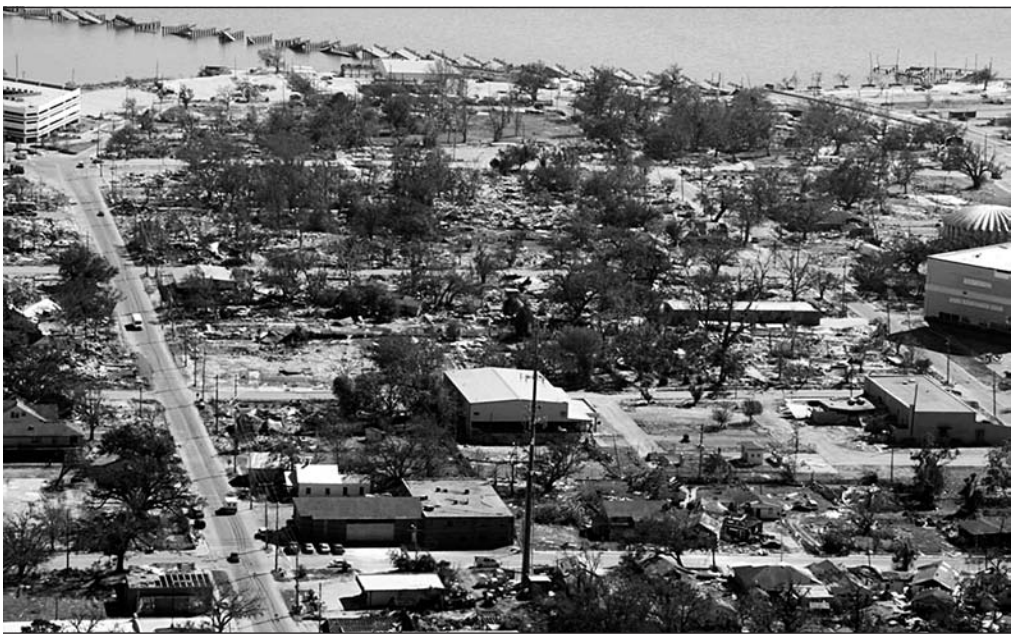
[1] The sense of the word "experience" used here follows John Dewey's writing in his book *Experience and Nature*. (See Dewey, 1958.) John Dewey later stated that he wished he had called the book *Nature and Culture*. (See Menand, 2001.) Oliver Wendell Holmes, Jr., also uses the word "experience" in a similar sense in his influential work *The Common Law*, in which he states that "experience is the life of law." (See Holmes, 1995.) Holmes's notion of experience, like Dewey's, includes beliefs, customs, and values and is behind his important teaching that precedence shapes the law more than principle.

When experience defines an idea as broad as culture, it is seen as being more shared than individual, more common than unique. Experience is the life force of a community in the way that values, beliefs, and customs form the community's identity within the living environment. Therefore, it follows that human experience—and not individual expertise—is the means, the context for judgment, the sustaining force, and the reward of community design work. The degree to which a design practice works with experience, not the measure of expertise, is the primary condition that distinguishes community design from a commercial architectural practice.

Expertise can certainly be brought into a community; however, in the urgency and displacement resulting from Hurricane Katrina in August 2005 (see exhibit 1), experience—not expertise—proved to be the essential ingredient for effective community design in Biloxi, Mississippi. David Perkes, of Mississippi State University's College of Architecture, Art, and Design, arrived in post-Hurricane Katrina Biloxi directly from Jackson, Mississippi, after 14 years of teaching college students the art of community-based design practice. The experience that David brought allowed us—the authors and the design team, as it grew—to immediately focus on relationship-building with local residents and community leaders, rather than on the nuts-and-bolts operational piece of starting a new community design practice. By transferring the experiences of the Jackson model to Biloxi, we connected quickly with local officials and faith-based organizations to implement the Mississippi State University's Gulf Coast Community Design Studio that has, since the fall of 2005, helped more than 200 displaced, low-income families restore or rebuild their Gulf Coast homes.

Exhibit 1

East Biloxi, Mississippi



An aerial view of East Biloxi 1 month after Hurricane Katrina destroyed many buildings in the city.

The Context

On August 29, 2005, Hurricane Katrina devastated the Mississippi Gulf Coast and led architects and planners from around the country to offer their expertise to assist in the face of unprecedented destruction. Several groups of professionals rallied to the relief efforts, but the most publicized was the Mississippi Renewal Forum, more commonly referred to as the "Governor's Charrette." This ambitious planning effort, which was organized and dominated by the Congress for the New Urbanism, attracted more than 100 architects, planners, engineers, and other professionals from outside the state and an equal number of professionals from Mississippi. The charrette took place in the middle of October, 6 weeks after the storm.

The workspace for the charrette was located in one of the shuttered casino hotels already busy with contractors working to get the casino back on line. Outside the improvised workspace, the damage on the coast was stunning, and the destroyed areas were still under military guard. The contrast between lovingly rendered drawings being pinned up inside the hotel and the massive, four-story casino barge smashed into the side of the hotel's parking garage was nearly impossible to reconcile.

It is safe to say that there has never been such a gathering of planning professionals brought in and put to work in such a place in such short order. Although the sense of urgency and the scale of the planning and rebuilding effort warranted that such an army of professionals be rallied into action, the event quickly came and went. Afterwards, the Gulf Coast communities were left with the overwhelming work at hand. The charrette process, which by design brings a team of professionals into a community for a short, concentrated design activity, relies on expertise. A community design practice, on the other hand, takes time.

Getting Started

Four early decisions guided the formation of what became the Gulf Coast Community Design Studio (GCCDS):

1. Create a workspace within the community to be served.
2. Form long-term partnerships with local organizations.
3. Avoid political and ideological alliances.
4. Most importantly, be useful to the community.

After the roads were clear and gasoline was available for travel, David Perkes used the first few weeks to seek out community organizations on the coast that needed help and could be potential partners. Our goal was for the College of Architecture, Art, & Design to become a component of the larger rebuilding effort. Rebuilding organizations were looking for the expertise that the College of Architecture could bring, and we were looking for the conditions of experience that would make us useful to the community.

Perkes met with representatives from many local and national faith-based and other volunteer organizations to identify design needs and available resources. He connected with Bill Stallworth,

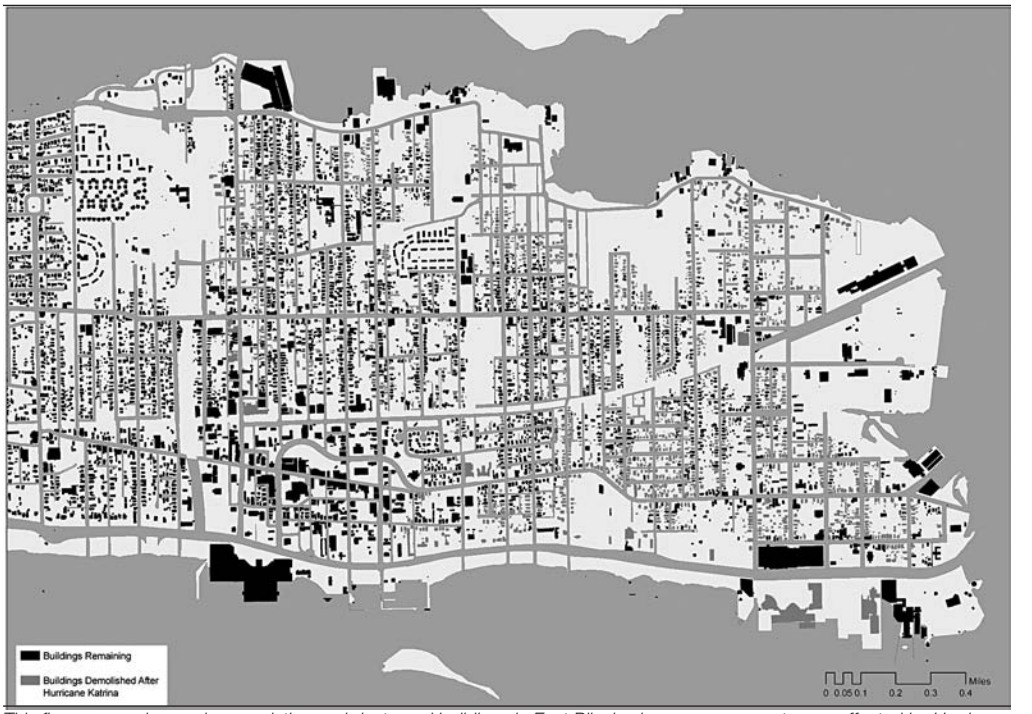
a member of the Biloxi City Council, who, immediately after the hurricane, had led efforts in East Biloxi to create a centralized place for volunteer groups to get information and coordinate their efforts. This newly formed organization became known as the East Biloxi Coordination and Relief Center, or simply "the coordination center." The GCCDS was one of a few key groups that would become permanent community partners in this coordination center—a strategy that would prove crucial to the rebuilding efforts.

East Biloxi Coordination and Relief Center

East Biloxi is an area 4 miles long and 1 mile across at the tip of the Biloxi peninsula. Most of the peninsula, which is less then 12 feet above sea level, borders on the Gulf of Mexico to the south and the Back Bay to the north. Hurricane Katrina's unprecedented storm surge, which was well over 20 feet in Biloxi, inundated the entire peninsula, affecting every house. When the water subsided, nearly half of the existing 4,000 houses had been completely destroyed and the other half had been flooded. With more than 10,000 residents, East Biloxi comprises around one-fifth of Biloxi's population, but, because of its topography, it represents most of the neighborhoods that were severely damaged by the hurricane. (See exhibit 2.)

Exhibit 2

Post-Hurricane Katrina Damage in East Biloxi, Mississippi



This figure ground map shows existing and destroyed buildings in East Biloxi, where every property was affected by Hurricane Katrina and almost all properties were inundated by the storm surge.

The GCCDS's first programmatic assistance to the community coordination center was the creation of the "grid map," which, by dividing East Biloxi into 24 numbered blocks, facilitated communication and coordination for the relief and cleanup efforts. The coordination center and dozens of organizations used stacks of the color grid maps, reproduced on 11- by 17-inch paper, to plan and distribute relief and rebuilding activities. The relatively easy task of making a well-designed map had a magnified impact. The primary function was to coordinate relief activities, but the grid map also resulted in two byproducts. First, the community looked at the map and was able to imagine an organized relief effort at a time when everyone felt overwhelmed and confused. This representation of organization focused the community's attention on the coordination center as the place where much-needed help could be found. The map's second byproduct was the way it introduced the community and the many relief organizations to the architects and planners of the GCCDS. Many people in the community were already suspicious of outside planners because of the highly publicized Mississippi Renewal Forum. Despite the charrette's support from the state's elected leaders and its positive publicity, many residents were upset that they had been left out of the planning process and were offended that a planning firm from California was showing them "what East Biloxi could look like." The fact that the GCCDS simply made clear and useful maps was an important way to gain the community's trust.

In the fall of 2005, the U.S. Department of Housing and Urban Development announced the Universities Rebuilding America Partnership (URAP) grant. To be eligible for the grant, the GCCDS needed to quickly identify a community partner. The formalization of the relationship between the GCCDS and the coordination center would become a critical step in the development of both organizations. For the GCCDS, in particular, it would define the role of the studio as one that is embedded within a community-based agency and in which design is one aspect of a larger reconstruction effort. The grant money from URAP became available in early 2006.

Working Method

The GCCDS's first objective was to organize a group of qualified architects and planners who could provide design and planning assistance for those people with the greatest need. This was not the time for teaching, even though opportunities to involve students would certainly follow. This was the time for professional action. Damaged houses needed to be assessed, volunteers needed help knowing how to repair houses, new houses with new requirements needed to be designed and built, hundreds of residents needed help making decisions about their community, and concerned people from all over the country who wanted to help needed to be organized and armed with necessary information and tools.

Maps turned out to be one of the most useful tools. Using Geographic Information Systems (GIS) to make effective maps exemplifies the overlap of expertise and experience. The grid map is one of many maps that the studio created for use in the community. The GCCDS's title block on these maps, which quickly became a familiar graphic reminder that a group of architects was working in the community, helped to bring a sense of order and encouragement to the residents, who were in the midst of confusion and disorder. Other maps the GCCDS created included flood maps to clearly explain the otherwise confusing Federal Emergency Management Agency (FEMA) advisory

flood levels, maps showing the disproportionate impact of the hurricane damage on Biloxi's Vietnamese community, and maps showing the change of policy for casinos newly allowed to be built within 800 feet of the coast line. The community soon recognized that the GCCDS had the expertise to produce such maps. As previously stated, however, expertise generally can be demonstrated and understood in value-neutral terms. Experience, on the other hand, is directly shaped by a community's values. The GIS mapping expertise, our access to information, and the tools and technical skills to produce these maps were effective only because the community had come to trust the GCCDS. Groups such as the local chapter of the National Association for the Advancement of Colored People, National Alliance of Vietnamese American Service Agencies (NAVASA), Coastal Women for Change, Mississippi Center for Justice, and Oxfam in America sought early meetings with the GCCDS director to determine our values and to see whom we represented. Once these advocacy organizations realized that we were willing and able to produce maps that depicted their community concerns, the GCCDS became a trusted community partner.

From the outset, Architecture for Humanity (AFH) was also a key East Biloxi partner. AFH is a "charitable organization that seeks architectural solutions to humanitarian crisis and brings design services to communities in need" (see www.architectureforhumanity.org/about). Identifying the GCCDS as a worthwhile partner in the rebuilding efforts, AFH sponsored a model home program and provided the GCCDS $25,000 to help hire an intern. This funding began the design studio's staff expansion and widened its reach into the community.

AFH began seeking funds for the coordination center and provided initial funds for the GCCDS to hire its first intern before the URAP funds were awarded. AFH succeeded in getting a rebuilding grant from Oprah's Angel Network for the coordination center. The funding, which covered some of the center's operating costs, was used to create grants for construction—$20,000 each for 75 houses. Additional funding was used to construct a group of model houses. Oprah's Angel Network has been East Biloxi's largest and most continuous source of funds for construction.

AFH also contributed by bringing Warnke Community Consultants to work with the coordination center. In the early spring of 2006, Warnke Community Consultants, along with the GCCDS and the coordination center, created and administered a resident survey. More than 600 residents completed the surveys. In addition, Warnke and the others led a series of community meetings to produce the *East Biloxi Community Action Plan.*[2] At around the same time, with the help of many volunteer architecture students during spring break, the GCCDS organized a complete property inventory of East Biloxi, which included more than 4,000 lots.

The results of the resident survey offer some insight into the community's experience of East Biloxi. When asked what people liked most about living in East Biloxi before Hurricane Katrina, the top response was "sense of community." The closely ranked second response was "friends and family." Residents selected these two choices on the survey twice as often as the other choices, such as "affordable housing," "schools," and "good place to raise children." Likewise, when asked to choose three things they most wanted to see rebuilt, restored, or improved in East Biloxi, the

[2] See Warnke Community Consulting (2006).

greatest proportion of respondents chose "affordable housing," followed by "sense of community." With hundreds of families displaced and living in FEMA trailers, placing affordable housing as the top priority is expected. Knowing that the respondents placed sense of community second, however, rating it above choices such as employment opportunities, low crime rate, schools, and social services, echoes the reasons people gave for why they liked to live in East Biloxi. The choice clearly indicates that the residents value social experience and that they identify East Biloxi as a place that has whatever it is that people imagine when they use the phrase "sense of community." For the GCCDS, the realization that we are working in such a place and that we are engaged in an effort to restore not only houses but the intangible set of values included in "sense of community" shapes the way we work.

The GCCDS used the property data from the completed inventory to create new, detailed maps. (See exhibits 3a and 3b.) The property database has been updated three times with the help of volunteers: in November 2006, June 2007, and June 2008. The GCCDS has used the data to produce maps describing property conditions, locations of trailers, and rebuilding status, as well as changes in these conditions over time. Many organizations have used the maps to describe the community's needs and rebuilding progress. Having detailed, current information and the ability to make well-designed maps have made the GCCDS useful to the community and led to the creation of many partnerships.

Exhibit 3a

Residential Property Status Map, 2006

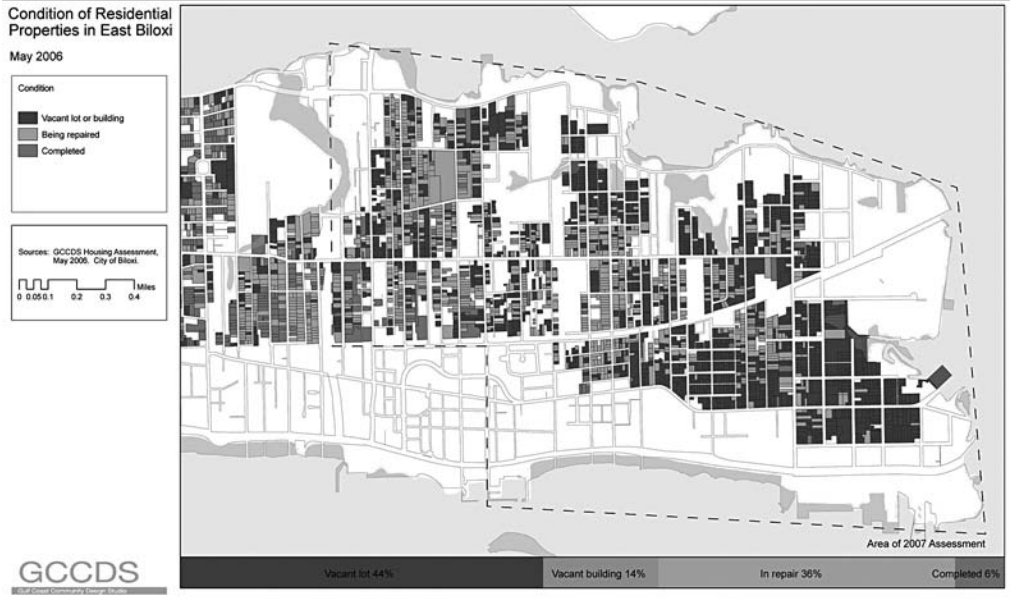


Exhibit 3b

Residential Property Status Map, 2007

Working Space

Just as experience is described here as the interactions among community, context, and actions, the work in East Biloxi can be understood through the lens of working environment, which initially was shaped by the emerging relationships among organizations and which now influences how those relationships continue to evolve.

The unusually high degree of cooperation among organizations in East Biloxi is evident in the day-to-day work and the working space. Out of necessity, the GCCDS and the coordination center initially shared workspace in the second-floor offices of a local church. Such pragmatic decisions were almost automatic in the unusual context immediately after the storm. Procedures and policies that would hinder the work were easy to spot and were to be avoided.

Although the GCCDS and coordination center appreciated this temporary workspace, it was too small and was divided into separate rooms. Both organizations soon needed more space, but their leaders believed that continuing to work in the same space would be most productive. Consequently, the two organizations began looking for a permanent building in which they could continue to share working space while having more space in which to work. In the new space, the two organizations were joined by NAVASA and two of the nonprofit organizations responsible for leading volunteer construction work.

At the same time the organizations were seeking new space, many volunteer organizations were working on hundreds of houses, cleaning out some, gutting others, and treating some for mold. The GCCDS, with the help of many volunteer architecture students, began to assess, measure,

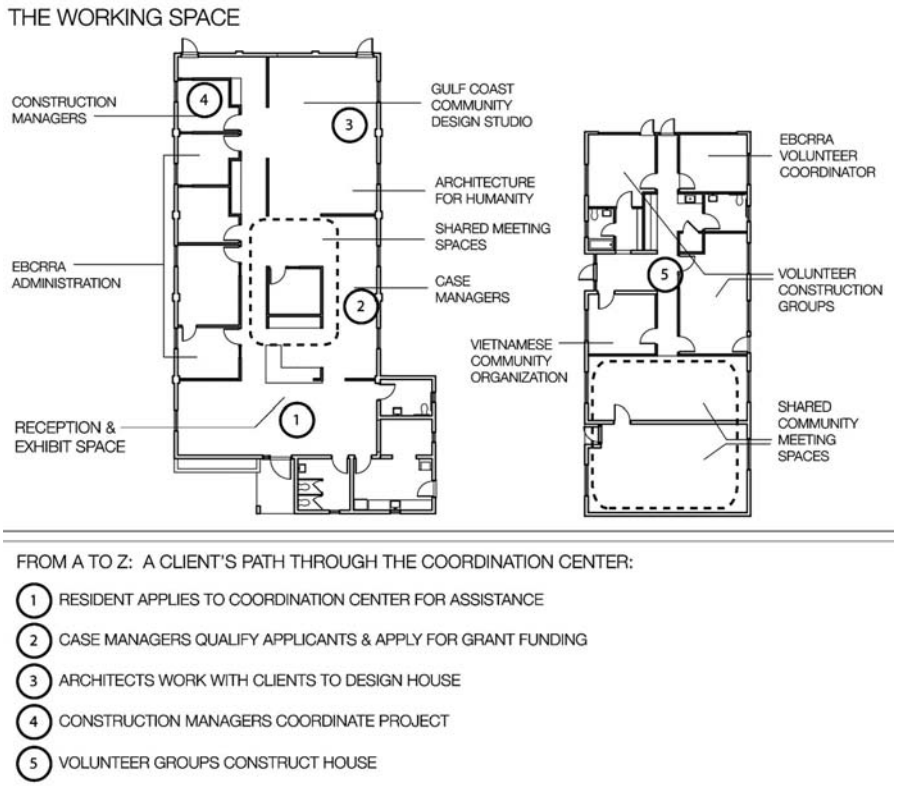
and replan existing houses. Then we began designing new houses. Soon people in the community began to see the GCCDS staff and the many volunteers as part of the coordination center. Although the GCCDS is part of Mississippi State University's College of Architecture, Art, and Design, it has not been important to the rebuilding work in East Biloxi to emphasize the university affiliation. In fact, it is likely that a community can tell when the overriding purpose of a community design center is to promote the university. Promotional activities are especially counterproductive in low-income, minority communities such as East Biloxi, in which residents are already suspicious of academics and outside experts.

In the spring of 2007, the coordination center and several of its partners, moved into a workspace that the GCCDS designed in collaboration with the coordination center and that studio staff, students, volunteers, and paid subcontractors built. This location also houses several of the volunteer construction organizations, as well as AFH and NAVASA.

The new location comprises two buildings, which were formerly used as a church and rectory. The plan of the new, renovated building shows the continuous flow of the design studio with the case management, construction management, and administration of the coordination center. The workspace is a direct and pragmatic architectural response that shapes the way work is done and the way the community imagines the work is done. (See exhibit 4.) Every day continuous movement

Exhibit 4

Plan Diagram of the Coordination Center



crosses open boundaries between different parts of the center. The materials, colors, and dimensions differentiate the different programs—intake and waiting, case management, administration, design studio, meeting—yet the entire space shares the strong volume of the building with its regular bays, repetitive windows, and exposed wood roof structure.

The boundaries between program spaces are intensified by large sliding doors that simultaneously separate and connect the spaces as they are used. The doors were constructed as large chalkboards, which offer surfaces for interaction. The sliding chalkboard door that forms the boundary between the design studio and the coordination center's construction managers' offices is especially significant because it is covered with the list of current house-building projects. More than 100 projects, listed by homeowner name and address, are updated continuously. The case managers and construction managers come into the design studio space to update and read the boards. In addition, dozens of visitors, elected officials (including the governor), potential funders, partners, and representatives of other rebuilding organizations have toured the coordination center, seen the case managers at work, met the construction managers, and ended up in the design studio in front of the two 4- by 8-foot chalkboard lists of projects. It is here, standing in the studio space amidst 12 architects and interns working at computers surrounded by drawings of houses, maps, and planning studies (see exhibits 5 and 6) that visitors typically provide a positive expression indicating that they are seeing something unique, the extraordinary effectiveness of a well-coordinated effort. The working space and the working method merge in the community's experience, inviting visitors to become part of what they see.

The shared workspace changes the day-to-day communication among clients, case managers, builders, and designers. In a typical architectural firm, project communication is formalized into presentations, job meetings, phone calls, e-mails, and transmittals. Although such communication methods are good for documenting and protecting the liability of the architect, they add time to the project and divide the various partners. A community design practice has the opportunity to reduce such administrative procedures because the design center is not using money to leverage control over how projects are carried out. Collaboration with volunteers and charitable funders means that the control is not centralized within the design studio only and that designers' personal relationships with construction managers, case managers, funding organizations, and volunteer-builder groups determine the outcomes of a given project. These relationships are created because the conditions of collaboration are based on shared goals of helping the larger community and not meeting the terms of legal and contractual arrangements. Professional expertise still requires accuracy and completeness, and the community design studio work should be held to the same standard of care as a commercial architectural practice; however, because the homeowner is not paying for architectural services and typically the construction is done by a volunteer organization that does not have a contractual relationship to the owner and architect, the design and building process is more dependent on cooperation than on contract. Therefore, more ongoing communication is necessary to keep the project on track.

Working with volunteer builders can present its own unique challenges. We have found that, at times, generous, out-of-town volunteer builders with previous building experience in mind take

up a part of a project through their own lens of construction and with the single goal of getting a family into a house. Their best intentions can be at odds with the structural strength, material durability, and design intentions of the project. This challenge brings heightened importance to the need for the community design practice to maintain effective relationships with all parties so that the houses we build serve the homeowner for many years and bring value to the community. The day-to-day collaboration of the stakeholders of the coordination center helps to facilitate these relationships and further roots the design studio in the community and in the community's values.

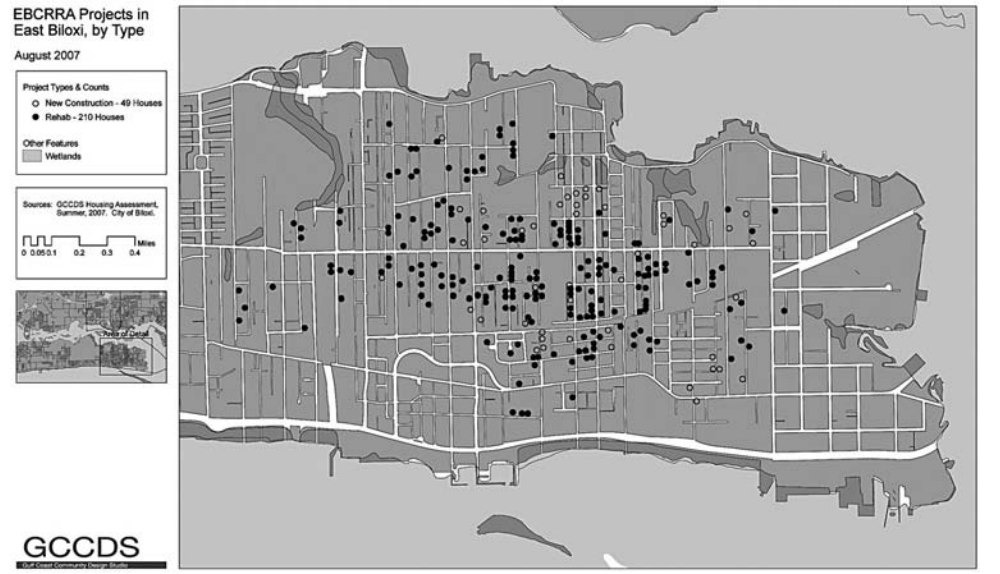
Exhibit 5

Working Space in the Coordination Center

Top: The entire workspace. Left: The project tracking board is used by all the organizations in the buildings. Bottom center: Bill Stallworth explains the coordination center's work to Governor Haley Barbour. Bottom right: Students pin their work on a studio wall. Center right: A case manager meets with a client. Center: Sliding doors in the design studio.

Exhibit 6

Map of Coordination Center Projects



Work Flow and Responsibilities

Three years after Hurricane Katrina struck, the GCCDS and the coordination center have a well-developed process. At any given time, approximately 30 active new house-building projects and 60 rehabilitation projects are under way. (See exhibit 7.) To date, the design studio has completed plans for more than 200 houses—150 rehabs and 50 new construction. A strength of the coordination center's work as compared with other Gulf Coast recovery programs, is its commitment to the resident.

Once a resident is on the list for a new house or an existing house renovation, he or she remains on the list until the project is complete. The money for construction is composed of a combination of the owner's funds and several grants. The average total cost for a new house is approximately $65,000, with volunteer labor for all of the construction other than plumbing, electrical, and mechanical. The coordination center assumes responsibility for selecting and qualifying the homeowner and managing the individual grant work. Once a client is ready for a house plan, he or she is added to the project list and the GCCDS begins meeting with the client to start the design process. On completion of the design, the GCCDS helps the homeowner obtain a building permit.

The coordination center's construction managers, with the help of the GCCDS, manage various building groups comprising paid subcontractors, volunteer organizations, sometimes the GCCDS staff, and, in some cases, architecture students, all of whom help with the construction. The division of work is important to the process. If the GCCDS attempted to do the homeowner selection, grant management, and construction management work, we would be able to complete only a few houses and our professional expertise would not be fully used. The division of responsibility—case

Exhibit 7

Several GCCDS Homes in East Biloxi, Mississippi

management, design, construction management—in combination with daily collaboration, is key to the output of the coordination center. Because of the effectiveness of this approach to date, others are looking at this rebuilding method as a model for their communities.

Lessons

Several general lessons have emerged from the GCCDS's work within the community. These lessons are illustrated as the work is compared to other university-affiliated design-build programs. Most design-build programs emphasize the use of students and focus on a single building project. In this way, the building is conceived as exceptional in its design and in its building process. In other words, everyone involved sees it as being outside of normal practice. This exceptional distinction creates opportunities to experiment and is therefore beneficial to research and teaching goals. The GCCDS has some of the same ingredients as other design-build programs; however, the emphasis is shifted and the number of variables is multiplied. Typically, the GCCDS has approximately 30 new homebuilding projects at one time that are in either the design or the construction phase. All 12 GCCDS full-time interns and architects have several ongoing house projects. They

design each house with extensive interaction with a family, consultation with the case managers and construction managers of the coordination center, and day-to-day conversations within the studio. Many people are doing the construction: subcontractors, skilled volunteers, and, at times, GCCDS designers and students. The many projects and multiple participants create a complex system of feedback, so the design process is not focused on one exceptional house. Instead it is spread out as a practice.

The multiplied number of families, designers, case managers, funders, builders, church groups, code inspectors, and neighbors is the context of the GCCDS community design practice. The emphasis is not on an exceptional house or on a group of fortunate architecture students. Experience, in its inclusive sense, does not have a narrow emphasis. There are special times of focus that demonstrate strong contrast to the daily background of this broader practice. At a house dedication, for example, the new homeowner, a group of faith-based volunteers in matching T-shirts, architects, interns, students, and case managers might be standing in the newly finished house. One of the volunteers, who now changes roles from a builder to a minister, asks that everyone hold hands as he offers a prayer. Tears are shed. The homeowner feels the outpouring of compassion. The house becomes a sacred place and the professional roles drop away long enough to share the experience. And then we go back to work.

Authors

David Perkes is director of the Gulf Coast Community Design Studio and an architect and associate professor at the Mississippi State University College of Architecture, Art, and Design.

Christine Gaspar is an intern architect and community planner with the Gulf Coast Community Design Studio.

References

Dewey, John. 1958. *Experience and Nature*. New York: Dover Publications.

Holmes, Oliver Wendell, Jr. 1995. *The Common Law (1881)*. In *The Collected Works of Justice Holmes: Complete Public Writings and Selected Judicial Opinions of Oliver Wendell Holmes,* Volume 3, edited by S. Novick. Chicago: University of Chicago Press.

Menand, Louis. 2001. *The Metaphysical Club*. New York: Farrar, Straus, and Giroux: 437.

Warnke Community Consulting. 2006. *East Biloxi Community Plan*. http://www.warnkecc.com/wp-content/uploads/BRC_Plan_6.29.06.pdf (accessed November 10, 2007).

Biloxi Treehouse Project

Vincent Baudoin
Gulf Coast Community Design Studio

Abstract

When a group of students and designers took on the task of rebuilding Patricia Broussard's East Biloxi home, they knew that building an elevated home to a high standard of quality and sustainability on a very limited budget would require a new approach. The project, known as "the treehouse," became a laboratory for collaboration among students, designers, construction professionals, and volunteers seeking new solutions to these problems. The techniques explored and lessons learned will contribute to a higher standard for rebuilding along the Gulf Coast.

Trees and grass have begun to overgrow some of the East Biloxi, Mississippi, lots where rows of traditional shotgun houses and Creole cottages once lined the streets. Hurricane Katrina's storm surge, floodwaters, and wind destroyed many of these homes or damaged them beyond repair. Although the debris piles have been cleared, many homeowners have so far been unable to return; others live in trailers while their houses are repaired or rebuilt. On one of these quiet blocks, rising above this transformed landscape among the live oak and poplar trees, is Patricia Broussard's future home—which many local residents have begun to call simply "the tree house."

This house among the trees, elevated 13 feet from grade to floor level (see exhibit 1), draws stares for its height and its unconventional looks, but it is also unusual in ways that are not immediately visible. The project has acted as a laboratory for a number of approaches to coastal rebuilding. First, a collaborative design process drew on the ideas of the homeowner, architects, sustainable design experts, and a diverse body of students and volunteers. Second, its construction combined students' design/build work with contracted work and volunteer labor. (To see photos of the architect, design students, and AmeriCorps volunteers, visit www.huduser.org/periodicals/cityscpe/vol10num3/cs_images.html.) The designers aimed for environmental certification in the pilot Leadership in Energy and Environmental Design (LEED) for Homes program by improving efficiency and durability and minimizing the adverse effects of construction. Finally, the project addressed the challenges of hurricane reconstruction through features intended to increase the longevity and safety of the structure, in ways that typically exceed local standards.

Ms. Broussard's house was built through a collaborative project undertaken by community-based organizations, universities, professionals, and the homeowner. Two organizations initiated the

Exhibit 1

East Biloxi Treehouse and FEMA Trailer

Patricia Broussard's new East Biloxi house rises behind the Federal Emergency Management Agency's (FEMA's) trailer in which she has lived since Hurricane Katrina damaged her home. Photo credit: Vincent Baudoin.

project: (1) the Hamer Center, a sustainable-design center at Pennsylvania State University, and (2) the Gulf Coast Community Design Studio (GCCDS), a Biloxi-based outreach and research arm of Mississippi State University, which is partially funded by a grant from the U.S. Department of Housing and Urban Development's Universities Rebuilding America Partnerships program. Brad Guy of the Hamer Center, Bryan Bell of the architecture nonprofit Design Corps, and Sergio Palleroni of the University of Texas at Austin brought together a group of architecture students to design and build the house. These professionals instructed the students to consider the homeowner's needs, the community context, and the necessity of hurricane-resistant construction. Other groups contributed expertise or resources: Southface Energy Institute offered environmental consultation, the Salvation Army provided materials, and AmeriCorps and several faith-based groups contributed hundreds of volunteer hours.

The design team worked closely with Ms. Broussard, learning from her significant knowledge of the neighborhood, her requirements, and her love of gardening and trees. Architect David Perkes of the GCCDS contributed his engineering expertise to the bracing design. Other members of the GCCDS and its partner community organization, the East Biloxi Coordination, Relief, and Redevelopment Agency, contributed construction expertise. Volunteers, ranging from those with no experience but plenty of enthusiasm to construction professionals, gave thousands of hours

of labor. Local contractors performed parts of the framing, roofing, plumbing, electrical, and mechanical work.

Design team members Jason Pressgrove and Jami Primmer, a LEED Accredited Professional, helped coordinate the architecture, site design, construction, material and fixture choices, and other aspects that contribute to the overall environmental sustainability of the project. Students collected salvaged materials from nearby sites (see exhibit 2), such as an art museum designed by Frank Gehry that was destroyed by Hurricane Katrina, and from sites as far away as New Orleans. The design, which incorporates these salvaged materials, also includes a south-facing porch (see exhibit 3) and an extended south overhang for shading and high-albedo finishes, including a galvanized aluminum roof that reflects sun, to minimize heat gain.

Because the nearby trees have weathered numerous hurricanes, the "treehouse" is designed to be similarly resilient. Like other houses being planned in the area, it is elevated above FEMA's advisory flood elevation, approximately 13 feet. At this height, the house must be strongly braced to resist hurricane-force winds. The bracing members branch in multiple directions across the underside of the house, further extending the metaphor of the tree. The supports are a hybrid system of reinforced concrete columns supporting treated wood posts. This design keeps all wood above ground and eliminates the need to drive piles. A series of ties between footing, column, post, rim joist, wall, and rafter ensures a continuous vertical structure that should protect against uplift.

Exhibit 2

Salvaged Materials in East Biloxi Treehouse

Left photo: A window box projects from the west side of the house, clad in stainless steel panels salvaged from architect Frank Gehry's nearby art museum, which had been destroyed during Hurricane Katrina. Right photo: Bracing branches out from a center column made from a salvaged telephone pole. Photo credit: Vincent Baudoin.

Other questions have yet to be addressed: the difficulty, for instance, in installing hurricane shutters on windows 16 feet above ground. The lessons learned from this project will inform the design and construction of other elevated houses planned for Biloxi and the rest of the Gulf Coast.

Exhibit 3

Details From the East Biloxi Treehouse

Clockwise from top right photo: The front porch space with French doors looking out toward the Gulf of Mexico; the custom-built kitchen cabinets and tile counter already being personalized; openness found in a view from the bedroom across the breezeway; the shower in which broken-tile mosaic incorporates remnants of dishes and other pre-Hurricane Katrina possessions. Photo credit: Vincent Baudoin.

Author

Vincent Baudoin is a Design Corps fellow working with the Gulf Coast Community Design Studio in Biloxi, Mississippi.

URBANbuild: Architectural Networks of Real Urbanism

Ila Berman
California College of the Arts, URBANbuild, and Studio Matrixx

Abstract

Tulane URBANbuild is a comprehensive community outreach program that the author initiated to provide urban design and innovative, sustainable prototypical housing solutions to actively support the rehabilitation of New Orleans' neighborhoods subject to damage in the aftermath of Hurricane Katrina and to revitalize areas of the city historically dominated by blight and abandonment. This article describes the issues and challenges of promoting real urban intervention within this context and elaborates the research agenda and complex taxonomy of urban and architectural tactics generated within this program. Field, network, and topographic design strategies constitute the generative and methodological terrain for proposed urban transformations within these neighborhoods. These strategies focus on promoting the densification, diversity, and environmental sustainability of critical core urban territories within the city by recuperating and consolidating their eroded urban tissue, while advancing innovative proposals for new forms of aggregated housing, infrastructural mixed-use environments, and multiscaled, site-specific urban interventions.

Architectural Speculations on Real Urbanism

The terrain between research and practice and between design speculation and reality is difficult to traverse. In New Orleans, the reality of this terrain became known through the magnitude of devastation and the extent of the need for recovery after Hurricane Katrina. This reality, however, is by definition not limited to the immediacy of the physical and material world that makes up this city—its "artifacture." This reality also includes the limits of knowledge, experience, and imagination as they relate to the boundaries of physical objects.

This reality is in fact paradoxically immaterial, because it consists of cultural representations that constitute a collective reality that dominates individuals, communities, and cities. Collective reali-

ties are the dominant myths and sets of representations shared by a group through which the "real" is approached, understood, and reinstantiated.[1]

New Orleans certainly has its own local reality. This statement is a simplification, however, because this city is not one reality but a composite of many local realities, each with its own historical and cultural lexicon, and each with a set of rules and values defining the framework for its urban reality and the terms of its local knowledge and experience.

Since Hurricane Katrina made landfall in this city, the representations of these realities are continuously being rewritten—both from within and without—representations that either reaffirm or challenge the status quo and that either reduce or expand the possibilities for this city's future. Now, post-Hurricane Katrina, the *urban realities* of New Orleans in many ways have become substantially limited—yet, because of the storm's environmental, socioeconomic, and political outcomes—the city's *real urbanism*, in every sense of the expression, has not.

Real urbanism may be happening on two very different fronts in New Orleans. One front is embodied in the real events—the urban realities—that daily inject life back into this city and that have been operating with all means possible since the hurricane; the other front constitutes a very different idea of real urbanism—urban propositions currently outside what we believe to be the limits of possibility in relation to the city's rebuilding. As a physical crisis, the hurricane produced enormous fissures in the day-to-day realities of the citizens of New Orleans, exposing forms of environmental and economic realities that had become hidden either deep within or far beyond its urban fabric. The disaster also revealed a form of the real that might hold a different promise for this city—the real from which all future urbanisms for this city might emerge. The necessity to rebuild has, in a sense, shifted the trajectory of the city's urban and architectural practices, which traditionally had remained blind to environmental vulnerability and consumption, infrastructural need, urban blight, and the growing concentrations of poverty within its inner city core, toward something that can challenge such practices and promote a better urban future based on the principles of sustainability, density, diversity, and connectivity.

This idea of the real is at once highly material and yet not, because it refers to a world that is not yet known, potentially imaginable although not yet made. As architects and urbanists, we are aware that the act of making is always one of projection, which moves from the potential of the real toward reality. In this process, we not only have to imagine virtual possibilities beyond those with which we are familiar, including ideas and images that occupy the realms of the unrecognizable and unknown, but we also have to materialize and actualize these possibilities—make them evident in the world—by grafting them onto, or inserting them within, existing realities so they can be substantiated. Indeed, New Orleans' future reality might be understood in precisely this way—that it will reside, not simply in the repetition of its past, but in the positive transformation and revitalization of its existing reality, by unlimiting its potential through interdisciplinary networks and community partnerships that support innovative thought and intensified action.

[1] This distinction between the "real" and "reality" is elaborated in the writings of Jacques Lacan in the *Ecrits* (Lacan, 1977, 1989). According to Lacan, the *real* is a term that refers to the presignifying world of immanent matter, whereas *reality* refers to its dominant set of representations that govern the acculturated world of the symbolic.

It is from this perspective of real urbanism that URBANbuild was formed. URBANbuild is a collaborative urban and architectural design, housing prototype, and design-build program at the Tulane School of Architecture in New Orleans. Its comprehensive 2-year program, composed of an integrated network of 12 urban and architectural design studios and 4 design-build studios, was launched to act as a laboratory for city research and a generator of innovative design strategies for the city's future. URBANbuild, established with the support of a $300,000 U.S. Department of Housing and Urban Development grant, was founded on the premise that the resources of an academic institution dedicated to architecture and urbanism might be applied to this city as an object of study and speculation to engender positive urban and architectural scenarios for its rehabilitation and future development. In addition, through its community partnerships, URBANbuild's design-build program sought to directly contribute to the material process of the city's reconstruction by developing and constructing housing prototypes to seed the immediate rebuilding of communities.

One initial objective of URBANbuild was to creatively address the problematic "wounds" existing at the core of the city, areas that had been emptied out, not just by Hurricane Katrina, but by a long history of abandonment, blight, crime, and urban decay. URBANbuild directed its research and proposals toward supporting the urban revitalization of four contiguous target areas in New Orleans, moving from Central City to the Tulane/Gravier district and the Sixth and Seventh Wards, defining a circumferential band of urban space that runs parallel to the Mississippi River (see exhibit 1). Target areas for research and immediate intervention were determined based on cultural, demographic, topographic, and infrastructural urban research.

Historically, these neighborhoods have deep cultural significance as the site of former plantations. They contain some of the oldest historic structures of the mid- to late 19th century, which have been occupied by multiple generations of African-American and Creole families and many diverse immigrant populations, including Irish, German, Italian, French, Spanish, and Jewish, who settled this region at different times in history. The Faubourg Treme (Sixth Ward), in particular, is celebrated for its rich diversity as the historic home of the black Creole community and is claimed to be one of the oldest African-American neighborhoods in America.[2] Although these

Exhibit 1

URBANbuild Objective: Address the Wounds at the Core of the City

Left: Urban blight in Central City. Photo credit: Mona El Khafif. Right: Target areas.

[2] For an indepth overview of the historic cultural geographies of New Orleans, see Campanella (2006). Also see Lewis (1976).

neighborhoods were once thriving communities located at the core of the city, now they are far less diverse, inhabited predominantly by an African-American, economically depressed population. Of the population of these target areas, more than 50 percent of households earn an income below the poverty line, compared with 28 percent of households in the city, 20 percent in the state, and 12 percent in the nation.[3] Although these neighborhoods represent the highest concentration of households living below the poverty line in New Orleans, they are directly bordering some of the wealthiest areas of the city.

Mayor Ray Nagin's Bring New Orleans Back Commission report of January 2006 identified these neighborhoods as "Infill Development Areas," located directly adjacent to those neighborhoods determined as "Immediate Opportunity Areas." These destinations were identified in part by the number of empty lots readily available within their boundaries, in combination with the fact that these areas were not subject to the same level of destruction by the hurricane as were other areas in the city (as a result of their higher elevation). In New Orleans, the strong collusion of history and topography reveals the ways historic urban development corresponded to, and closely followed, geography. Economically, however, these neighborhoods were in severe decline before Hurricane Katrina came ashore, representing a substantial portion of blighted and abandoned properties and the highest percentages of underutilized property existing within the urban center of the city.[4] Post-Hurricane Katrina, this condition has been amplified through increases in vacancy rates and the resulting intensification of urban blight and debris—conditions that will worsen if strategies, including social, economic, infrastructural, and architectural, are not developed for the reoccupation and densification of these neighborhoods and the consolidation of their eroded urban tissue. Geographically, these neighborhoods are located within a zone with elevations determined to be close to or at sea level and, therefore, are subject to minimal flooding, in contrast to many other lower lying areas of the city that have been rebuilding far more rapidly, despite their environmental risks, because of the economic resources available to them. In addition, because these target areas are directly adjacent to more developed and stable urban communities, they can draw from the infrastructural support of these adjacent territories, provided methods are generated to stitch across the boundaries that separate these neighborhoods. This band of urban space, like that along the river's edge, represents prime real estate within the city's historic center that is currently underutilized and in serious need of reconstruction. The city of New Orleans as a whole is dependent on rehabilitating these areas, which are deeply wounded at their core.

In the URBANbuild program, these identified core target areas were the subject of both research and design. Urban and architectural studios within the program moved through several scales:

[3] These statistics are based on URBANbuild demographic research. See U.S. Census Bureau (2005, 2002).

[4] Statistical and mapped information documenting blighted properties in the target areas investigated were culled from the following city agency sources: (1) the list of adjudicated properties organized by ZIP code; (2) the city website's records of tax and ownership status; (3) the blighted property list issued by the New Orleans Redevelopment Authority; and (4) the "Blighted and Abandoned Property and Poverty Status for New Orleans, LA" maps prepared for the city of New Orleans, May 2004, based on data sources from the U.S. Bureau of the Census, 2000, and the city of New Orleans. Additional sources include a project initiated by the Tulane City Center and supported by the Fannie Mae Foundation, which developed a detailed document mapping the extensive inventory of adjudicated properties post-Hurricane Katrina in the Sixth and Seventh Wards, and Central City and Tulane/Gravier districts, published in July 2006. This research was supplemented by extensive field documentation and assessments of property conditions in these districts by URBANbuild.

from the scale of each neighborhood and its relationship to the surrounding district and city to the architectural scale while traversing a spectrum defined at one end by extensive macro-architectural projects thought in relation to either large-scale infrastructural elements or housing for the urban megablock to, at the other extreme, small-scale interventions intended as incremental design strategies. These studios included developing aggregative portable and mobile dwelling units, as well as prototypical design-build houses as innovative low-cost models for seeding neighborhoods dominated by blight and abandonment. This program is an attempt to work across scales and disciplines, producing much-needed continuities as a counter to the traditional segregation of disciplines, studios, and projects. The process requires collaboration within an academic institutional system that historically has advanced the individual project over the collective effort and segregated rather than integrated the disciplines of architecture, urbanism, and landscape. Terms such as landscape urbanism emerged from the realization that the design professions needed to move toward a shared and more integrated form of practice that engaged both large- and small-scale processes and artificial and natural ecologies.

Urban Mappings: Fabric, Infrastructure, Landscape

The integration of research strategies with applicable design practices is another critical part of this process to ensure that these strategies and practices remain continuous and mutually defining. Here, the importance of empirical research is not simply in the culling and investigation of urban, environmental, and demographic data, but also in the specificity of the information collected—its selection and framing—and in the ways it is mapped, analyzed, and graphically transposed to be reinserted into the design process. Below the surface of every map is its hidden logic and representational method. The intention of these mappings is both to expose what is unseen within the normal parameters of urban experience and to advance different ways of understanding the urban and architectural layers and the deeply buried genetic code of this city. The aim is to be precise, yet interpretive, in order to displace the illustrative and signifying map with one that is an operational instrument in the design process. In this way, the mapping and diagramming of information is more than a method by which the density of statistical or other forms of information about these neighborhoods is condensed and rendered visible. These layered urban inscriptions are also intended to be critical tools in the evolutionary process of design. They can be considered procedures for the mediation and synthesis of vast amounts of urban, environmental, topographic, and programmatic data that become operational as they are integrated with new material in the generation of informed configurative design strategies.

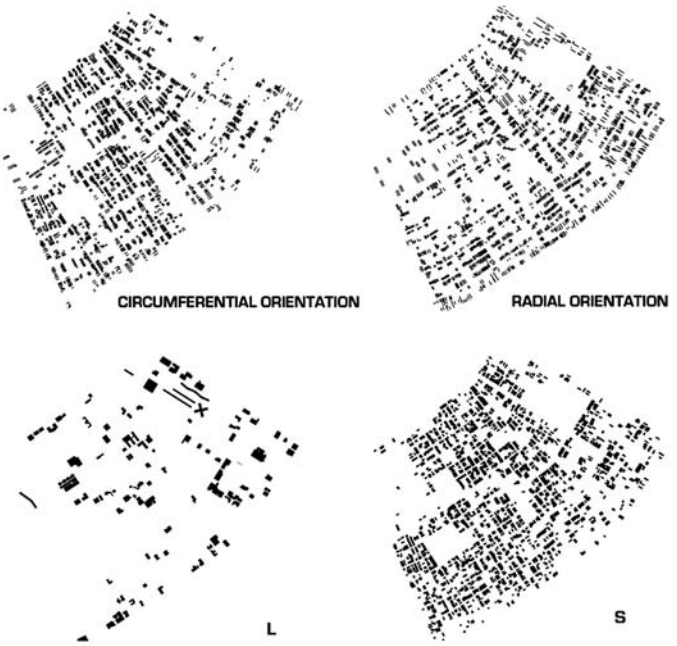
These mappings and diagrams are therefore understood to be evolutionary rather than simply innovative, in that they follow the principles of transformation intrinsic to the development of both natural species and indigenous cultural ecologies. Each act of mapping also involves transferring knowledge across distinct disciplines and establishing varying forms of congruence and differentiation. Each map is also spatial and political, operating from the bottom up and top down—simultaneously an act of recording and an act of invention. In addition, each act of mapping is specific to the material that it encounters, furnishing methods of mediating the real that allow for, and proceed toward, informed intervention, whereby internal consistency is both derived from, and integrated with, the phenomena investigated.

Urban Structure and Morphology

In the research phase, one of the most dominant conditions of New Orleans' urban history to be graphically elaborated was the organization and morphology of its urban fabric. The structure is understood as a negotiation between the stasis of the regular 300-by-300-foot typical gridded block structure—a derivative of the original 200-by-200-meter urban grid of the early 18th century Vieux Carré—that is repeated throughout the city's historic neighborhoods and the mobile shifts and overlaps in this system resulting from larger geographical influences, as this grid is reoriented to follow the tangents of the Mississippi River's undulating curvature. The archetypal configurative imprint of the early agricultural plantations is the hidden organization underlying the placement of all major boulevards as well as radial and circumferential patterns at the base of the city's urban field. Dominant radial boulevards, oriented perpendicular to the river's edge, originated as the boundaries or centralizing axes of these plantations, whereas the shifting yet continuous circumferential primary road networks running parallel to the river emerged from the evolution of the plantation's agricultural zones, as a series of layered bands moving away from the river. The process of urbanization continued by dividing these sites according to an externally applied gridded logic, generally locking onto the centralizing axes of the plantations and generating a series of layered and colliding itinerant grids that organize the urban fabric (see exhibit 2a). Despite the apparent stasis of this urban block grid, the structure of the city is dominated by directional rather than dimensional attributes, locally evidenced by the convergence and divergence of streets as one moves closer to the edges of these shifting gridded plates, and by the directional grain of radial and circumferential avenues that define the global structure of the city's infrastructural organization.

Exhibit 2a

Central City Urban Mappings: Urban Fabric/Grain



Mappings that further delaminate the internal divisions within these blocks employ line drawings to expose the directional pattern of this finer radial and circumferential field, defined by both the orientation of land parcels and the rhythmic distribution of long linear buildings within each block. This woven pattern of linear parcels, which defines yet challenges the shifting yet dense perimeter of the typical block, supports a similar grain of low-rise housing stock, characterized as much by its chaotic spatial and material differentiation as its dimensional and typological consistency. These mappings reveal the insistent striations of the urban structure hidden below the eroded fabric of these neighborhoods. In addition, intense rhythmic patterns define the distribution of open and built space, made evident through abstract solid and void planimetric drawings of sampled sections cut through the edges and centers of a series of contiguous blocks to expose the shifting scales and densities, as well as the variable spatial and material rhythms that characterize the streetscapes and internal blocks of the historic neighborhoods of this city.

Urban Infrastructure

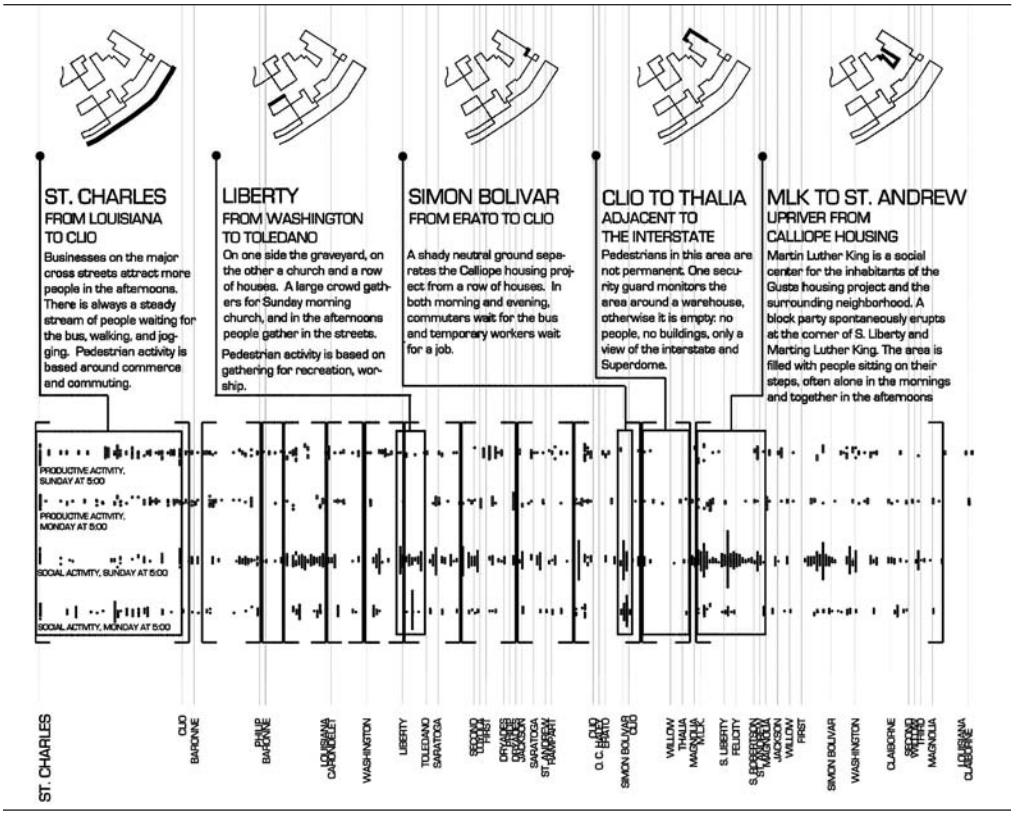
Despite the evenness and density of the city's organizational structure, the actual built fabric of these neighborhoods is far less dense. It consists primarily of small, single- or two-story multifamily houses, threaded through by small-scale public buildings along commercial corridors and punctuated by sparsely distributed fields of large institutional or industrial buildings, which have locally colonized individual blocks. The commercial corridors within these neighborhoods, such as Oretha Castle Haley and Martin Luther King Boulevards in Central City and Broad Street and Claiborne Avenue within the upper Treme, are comprised of primarily abandoned buildings and eroded spaces, so that their programmatic function within the infrastructural system has been minimized, if not almost entirely eliminated. Claiborne Avenue is one of the most important larger commercial corridors and east-west infrastructural conduits linking all target areas. Despite this geographical importance, Claiborne lacks the urban density and sufficient public transit systems needed to support residents in these neighborhoods, most of whom have no access to private vehicles, and to permit easy access to other parts of the city. Similar to the modern highway systems that collide with and bifurcate these neighborhoods, streets such as Claiborne and Broad have become major traffic routes that slice through these neighborhoods dividing them from adjacent parts of the city.

Highways, unlike streets, are directional vectors that interrupt urban space rather than edges that dimension, define and organize it. These highways are unconcerned with the territories that they bifurcate, given that the primary role of highways is to connect distant locations via a high-speed attenuated network. These highways and other infrastructural conduits, as well as the erasures produced by industrial occupations and multiblock social housing projects, are responsible for most anomalies within the intricacies of the urban mesh, creating insurmountable boundaries and divisive gaps that cut into the consistency of the older fabric. Urban infrastructure in these neighborhoods therefore functions far less as a working network of connectivity than a dimensional organizational structure that allocates space and defines the edges and internal territories of the urban field. Because these communities lack adequate access to transportation systems and suffer from the overdetermination of social, economic, and spatial boundaries that divide their neighborhoods from adjacent areas, they become far more insular. Connectivity within these areas therefore happens through local networks of mainly pedestrian activity—informal and fluid patterns of

movement that traverse these neighborhoods at entirely different scales and speeds than that of the surrounding city (see exhibit 2b). These informal networks were spatially and temporally mapped at different times over a period of days, across a range of aggregated smaller scaled vicinities, to understand the local patterns of pedestrian movement and types of informal social activity that dominate these areas. These networks have come to compensate for the lack of adequate public transit systems and institutionalized community networks within each of these neighborhoods.

Exhibit 2b

Central City Urban Mappings: Pedestrian Routes/Occupations



Urban Landscape

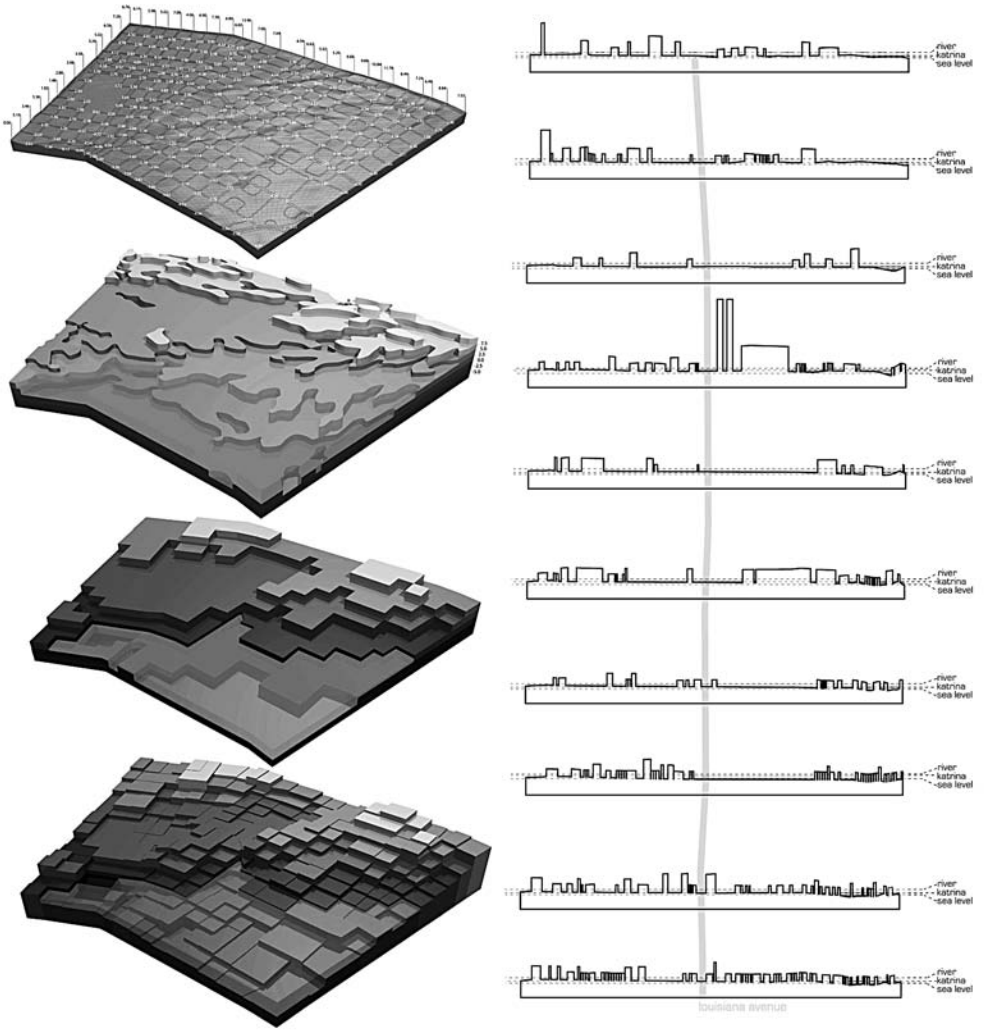
The planimetric mappings of the urban fabric contained within this research are supplemented by the equal emphasis placed on an orographic reading of this city through a series of topographies studying the layers of natural landscape and built form. In the past, *orography*, the branch of physical geography dealing with the sectional variability of the surface of the earth, seldom would have been discussed within the context of this very flat terrain. After Hurricane Katrina, however, topography is precisely what redefined the value of inhabitable neighborhoods, because the city's inhabitants, insurance companies, and regulatory agencies are now assessing the relationship of

these areas to sea level and to the unpredictability, yet regularity, of rising flood waters caused by the influx of potential hurricanes and other tropical storm systems (see exhibit 2c). In addition, if the lack of sectional variation and quantity of low-rise structures built below sea level, in combination with the extensiveness of the urban footprint of this city, contributed to the degree of devastation brought about by the flood, rethinking the urban map through the topographical section would enable a new understanding of the geographic parameters required for the city's future development.

The return to geography as a critical instigator of urban form is, at minimum, a necessity in a city historically defined by its relationship to water and landscape. Shifting elevations within these neighborhoods (a range of 7.5 feet above sea level to 5 feet below), mapped in relation to the elevations of the surrounding river and lake, as well as the higher flood line of Hurricane Katrina,

Exhibit 2c

Central City Urban Mappings: Topography



render explicit the quantity of built fabric remaining at risk within neighborhoods deemed to be on relatively "high ground" in contrast to other parts of the city. A matrix of elevational altitudes, laid out according to the urban block structure, produced a continuous series of layered vertical sections. Each layer corresponds to the topographies of ground, built fabric, and greenscape within each neighborhood, which were then spatially modeled in relation to sea level and the fluctuations of the water line. These topographies facilitated the layering and comparison of multiple systems, rendered visible and measurable through the precision of the section, and coordinated through their planimetric alignment with the urban grid. If the simple act of drawing a single continuous sectional line that connects the surface of the ground to the outside edges of buildings enables us to understand what we create as cultural and material extensions of the landscape—a continuous artificial terrain that we might traverse, rather than simply a collection of aggregated objects—the structuring of this system in relation to the urban plan ensures the inverse—the acculturation of this landscape within the parameters of an orthogonal urban structure. Combining the continuities that are intrinsic to the mappings of landscape with the planimetric structure and vertical and sectional emphasis given to built form, these topographies document, expose, and generate new potential relationships between the city's urban fabric and the other natural and artificial topographies—static and fluid, urban and "green"—that constitute the true ground of this city. The result is a new, thickened artificial landscape that might now be conceptualized in both environmental and infrastructural terms, while also being integrated with the discrete architectural and urban components of the system. This new synthetic system negotiates between different types of information without assuming the dominance of one over the other to create a viable form of landscape or infrastructural urbanism thought through continuous multilayered surfaces, interconnected networks, and aggregations of built form, rather than the compilation of discrete individuated buildings.

Urban Ecology and the Productive Greenscape

The URBANbuild program participants also generated environmental mappings and topographies focused on revealing the multiple, existing ecologies and green networks within these neighborhoods. These mappings invested attention not only in the domesticated and programmed green spaces, but also in the residual green wilderness of unprogrammed landscapes and overgrown abandoned spaces common to this city. Flowing green carpets, that, 2 years post-Hurricane Katrina, have entirely covered the archeological traces of recent urban history, no matter how disturbing from a cultural and historical perspective, indicate other ecological possibilities for the productive transformation and saturation of derelict urban spaces by means of environmental insertions and green infill strategies.

To think the "eco-centric" we have to warrant its emphasis in the initial stages of research and intervention. The equation of architecture and landscape within the urban matrix was ensured through mappings that articulated the qualities of greenscapes, in the formal, spatial, and material terms generally reserved for architectural analysis. We wanted to understand the relationship and reciprocity of natural and cultural systems and to ensure the integration of green systems and the scaling and continuity of components within future design strategies. This conflation of systems, which engendered abstract planimetric and sectional readings of environmental typologies (tree canopies, domesticated planted gardens, ground cover, lawns and other recreational green surfaces)

in terms of species, size, type, history and location, was then overlaid with urban interpretations of this green matrix understood through its densities, rhythms, programmatic differentiations, and spatial topographies.

Urban Strategies: Fields, Networks, Topographies

A critical goal of URBANbuild was to develop new interpretations of density to generate new forms of urbanity. We developed speculative strategies for a future form of urbanism which sought to be responsive to the need for intensive transformation within each target area, addressing the integration of the urban and the environmental, as well as the individual and collective. These strategies focused on the need for future cultural and economic diversity, the potential redensification of populations, and the attraction of residents back to the city's core (both from outside the city and from adjacent suburban vicinities). Urban and architectural proposals sought to achieve the reparation, saturation, and consolidation of existing urban territories and their cellular framework, the limiting of residential expansion, and the shrinking of urban footprints both within these neighborhoods and across the city as a whole. Our strategies encourage the city to explore many ideas to halt urban decay, including urban redistributions, the intensification of new forms of dynamic urban environmentalism, urban agriculture, and the introduction of dense recreational and ecological zones within the city's core. Such strategies for the city's redevelopment must be able to create the capacity to manage these changes over time and negotiate between the specificity of past incremental growth patterns and potential rhythms of future forms of architectural occupation and distribution.

Strategies for Urban Transformation

URBANbuild studios focused on a series of issues as conceptual directives in generating both a framework and taxonomy of operative urban strategies. The need for increases in density—of built form, infrastructural networks, and green space, for example—was responded to in multiple ways. These ways included local densities produced by infill strategies, such as the incremental insertion of small-scaled housing units or design-build houses into the residual spaces of existing blocks; the intense rhythmic stacking of hybridized programs in the rehabilitation of urban corridors; and the formation of variable configurations of high- and medium-density housing strategies for the new urban megablock.

Generating new strategies for multiple scales and forms of housing was the focus of the mid-scaled studios and one of the dominant issues explored by URBANbuild. The need for protection from flooding through environmentally adaptive strategies in lower lying zones was accomplished by creating artificial topographies responsive to the scale, systems, and historic rhythms of the existing built fabric. Design strategies furnished adaptations of the concept of landscape urbanism, for example, through densely programmed raised "piers" of housing, cultural, commercial, and recreational programs while simultaneously shrinking the urban footprint to support ecological initiatives.

Finally, the need to rehabilitate primary and secondary infrastructural networks and to expand the connective tissue within and across neighborhoods was achieved at multiple speeds and scales. We suggested new types of hybrid mixed-use programming applied to the restoration of commercial urban corridors; the development of important cultural, communal, and institutional nodes and networks; and the provision of diverse recreational landscapes operating as interconnected fields

within each neighborhood. At the larger urban scale, transformative mega-architectural projects are also advanced as a form of infrastructural urbanism to reinterpret and revitalize dead zones produced by the agglomeration of highway networks and their lack of integration in the city and to become new internal generators of activity for programs and amenities whose scales exceed those typical of the historic urban fabric. These responses can be classified as distinct types of strategies—distributed urban fields, layered urban topographies, and arrayed infrastructural networks—each of which is dominated by its relationship to fabric, landscape, or infrastructure. The responses also offer multiple urban solutions to aid in the rehabilitation and future development of each neighborhood.

Distributed Urban Fields

At the urban scale, URBANbuild proposed three types of field strategies to increase density, consolidate the urban fabric, and insert additional housing and supplemental programs in these neighborhoods. These strategies consisted of incremental distribution of variably sized built elements operating at the scale of the individual or aggregated residential lot, the typical urban block, and the large consolidated land parcel composed of multiple blocks. These urban typologies compose relatively dense or dispersed fields of differently scaled elements that form a larger multiplicity composed of individuated units of housing and additional support programs. As urban interventions and renewal strategies, field strategies often have the greatest potential for viability because their incremental and additive nature parallels the gradual growth and flexible distribution patterns of communities. They also embody the collective condition intrinsic to cities and can ensure the participation of multiple authors—urbanists, architects, designers, community leaders, and citizens—while establishing directives and limits for the development of a neighborhood or urban area. Their success as an urban strategy, however, is at the scale of the larger field—the territory that this field stabilizes and within which it intervenes, and the implied network that is generated through the interaction of elements within the field rather than through individuated buildings. Differences at the urban scale are determined by the pattern and density of the field, the scale and number of different typologies of elements inserted into the existing urban fabric, and the degree or intensity of intervention determined by the density of the field produced. Field strategies also operate both within and against the existing urban fabric, because their local insertions are determined by the structure of urban blocks and their parcelization, as well as by the existing opportunities for development in each neighborhood. Their logic as a distributed field, however, is open and flexible in nature, illustrating the way occupations, like markers on a game board, are able to transform the rigid organizational structures that define their possible positions. (See exhibit 3a.)

A key objective of URBANbuild was to establish new interpretations of prototypical multifamily housing types that might be inserted within existing neighborhoods as field conditions at the scale of the individual or aggregated lot (small grain) and at the scale of the urban megablock (large grain). (See exhibit 3b.) These multifamily housing proposals are intended to be alternatives to the single-family house on the one hand and the existing large-scale housing projects on the other—those housing models that dominate neighborhoods in the center of the city. These proposed small- and large-grain field strategies are advanced to increase urban densities, shrink the currently occupied footprint of the city, consolidate the urban tissue and the community it supports, saturate

Exhibit 3a

Megablock Zoning Strategy

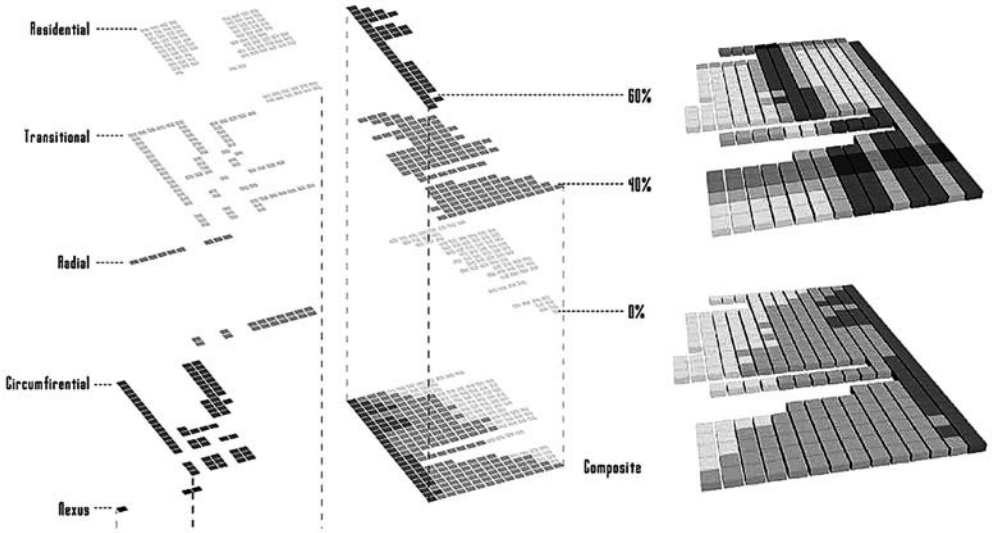
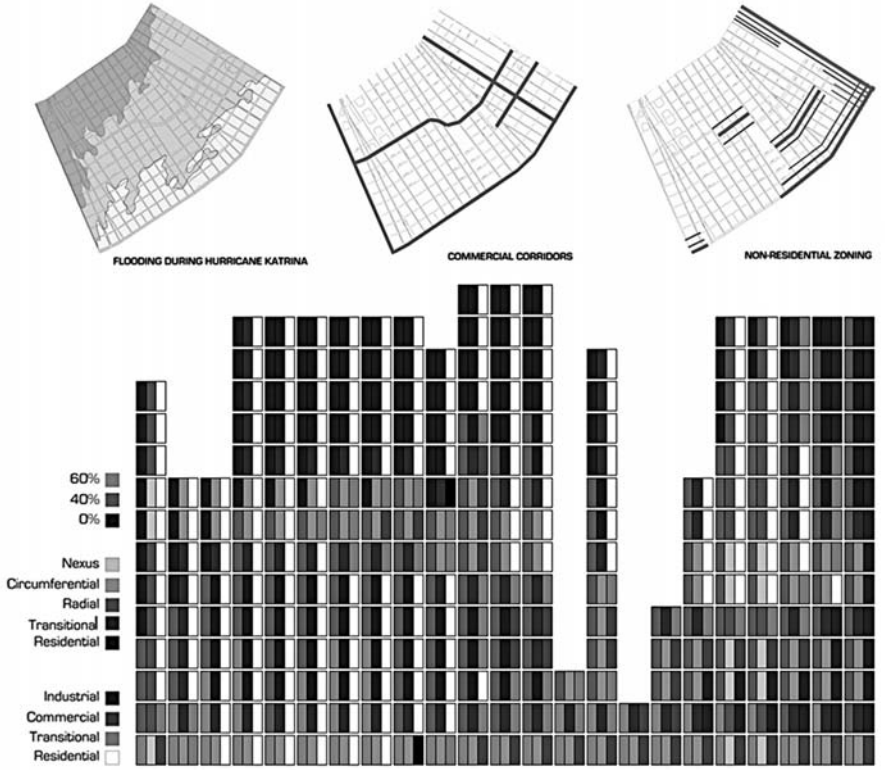


Exhibit 3b

Megablock Zoning Strategy



existing urban cells that have been eroded because of blight and abandonment, and provide aggregations of manageably sized units for mixed- and low-income communities. These strategies also furnish additional social, cultural, commercial, and recreational amenities to support these neighborhoods, offering strong links between places of inhabitation and the facilities and supplementary programs necessary to vitalize and sustain them.

At the larger scale, the urban megablock proposal sets out to establish a "rule set" defining the type of zoning or "genetic code" for different block types within each neighborhood. This rule set defines densities for housing and housing types, as well as percentages to be dedicated for green space and different combinations of commercial, cultural, and recreational programs to support the housing to be developed on each block site, representing at least 20 percent of the total programmatic volume. Blocks were also coded according to their relationship to the larger field, to dominant streets and arteries, and to neighborhood zones, determining both influences for block orientation as well as the types of amenities to be provided. By using site influences as codes for zoning, a genealogy of flexible block types was created, each of which could be individually defined and developed and which provided the site zoning for the HOUSING+ studio. This coded rule set also incorporates flood zones as dynamic but relevant levels for the sectional development of both program and topography, determining the elevations or levels of artificial high ground for different blocks—a new urban shelf or artificial landscape for occupation above sea level supporting increased density while allowing for more sustainable recreational landscapes below. The aim is to increase density in the vicinity of urban blocks where little risk of flooding exists, while designating high-risk, no-building zones in low-lying areas, with the intention that these be redeveloped over time as recreational territories, environmentally sustainable wetlands, and water reservoirs within the city.

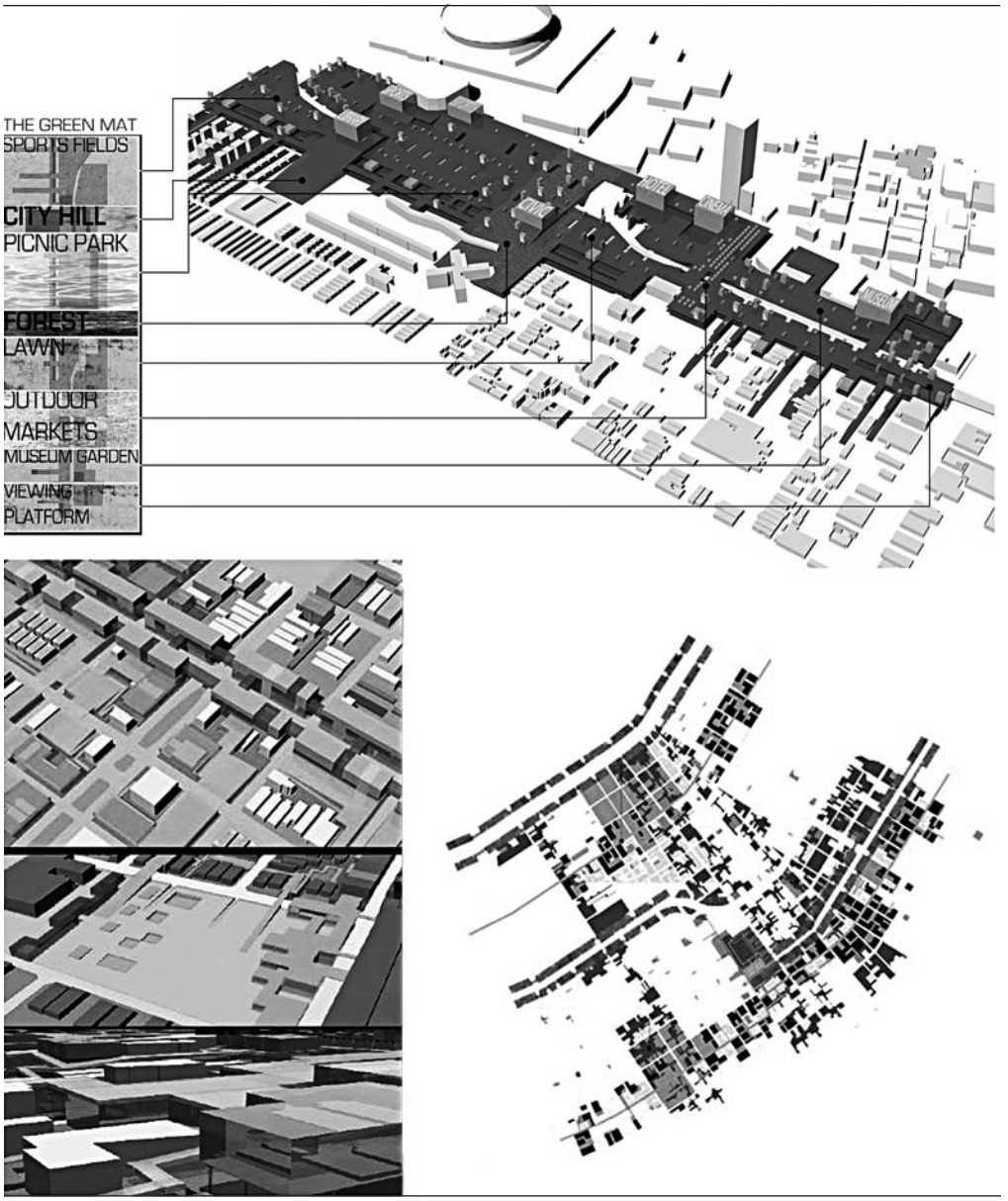
Arrayed Infrastructural Networks

URBANbuild studios proposed multiple urban network strategies. Each network strategy built on existing pedestrian, vehicular, and other infrastructural systems that incorporated new programmatic and spatial networks to furnish alternative urban spaces and landscapes, intended to vary and intensify the modes of interaction among residents in these neighborhoods. Network structures are branching arterial and capillary systems—"rhizomatic meshworks"—that establish a connective tissue between independent urban elements and catalyze and manage systems of movement, flow, and exchange. Similar to field conditions, network strategies also have the capacity to be incrementally generated, because they are based on models of hierarchical growth and are thus developable over time. These systems can be either dense and compact capillary systems or expansive and attenuated large-scale networks, operating at different scales and speeds, where local and larger systems can be integrated through overlapping infrastructural arrays and interchanges to produce dynamic synergies between different territories in the city (see exhibit 4).

URBANbuild proposals developed three scales of network systems: (1) smaller scaled interior branching systems generating intricate and multileveled pedestrian, social, and recreational networks within neighborhoods for the purpose of invigorating public spaces and vacant street-facing lots while linking these with leftover and overgrown interior spaces between street-facing parcels; (2) arterial urban corridor projects operating at the scale of the vehicular commercial

Exhibit 4

Infrastructural Networks



Top: Pontchartrain Expressway infrastructural landscape strategy. Bottom: Central City netscape strategies.

street directed toward the redensification and rehabilitation of important boulevards and avenues while reestablishing continuities with adjacent neighborhoods; and (3) large-scale infrastructural landscape projects aimed at the healing of residual scars produced by interstate highways and their extended field of ramps that have been indiscriminately sliced into the urban fabric. This last type of infrastructural urbanism often operates at the geographical scale, attempting to suture divided

territories through infrastructural bridging, large-scale urban megaforms, or extended landscapes offering new modes of connectivity and new scales of inhabitable public space.

The netscape strategy proposed for Central City, for example, which integrates multiple branching networks with an extended landscape of multileveled interconnected surfaces, is supported by the overlay of several urban elements: (1) a secondary pedestrian network connecting underused spaces in the interior blocks along Baronne and Magnolia Streets, supported by recreation, housing, and mixed-use development; (2) a new connective greenscape, linking multiple levels from pedestrian routes to recreational roofscapes in support of adjacent housing as well as other cultural and communal programs; (3) a series of densely developed, continuous commercial corridors along Claiborne Avenue, Simon Bolivar Avenue, and Oretha Castle Haley Boulevard, which integrate multiple interlocking programs supported by an elevated green network stitched across vehicular streets to facilitate uninterrupted pedestrian movement; and (4) a network of mobile urban architectures, programmatically and spatially linked with the 60+ churches and existing social services in the area to provide a nodal network of critical community support through myriad supplemental cultural, educational, recreational, and health-related programs such as GED (general educational development) classes, skill-based training, and health education/outreach clinics. In an additional studio at the microscale, the Mobile Urban Device (MUD) was further developed as a critical local strategy, supporting programs for multiple community partners and services in the area such as the Dryades YMCA, Edgar P. Harney Elementary School, Teach for America, CACTUS, the Goodwork Network, Second Harvest, Ashe Community Center, and the Central City Renaissance Alliance. This network operates through multiple systems, providing new public spaces in support of the neighborhood's active communal street life, offering much-needed amenities and accommodating a greater density of occupants that would be facilitated by the generation of new high- and medium-density housing models.

Large-scale infrastructural landscape projects, such as the geological urban megaform proposed for the Pontchartrain Expressway, attempt to transform what is now an enormous swath of unused space dividing Central City from the Central Business District into an attractor that can accommodate large commercial, social, and recreational spaces such as big box retail stores, cinema complexes, and sports fields—suburban amenities whose urban footprints exceed the existing grain of the historic urban fabric and that can act as economic and social drivers for rehabilitating these neighborhoods. The proposed strategy conjoins the two sides of the interstate by extending programmatic zones directly adjacent to the expressway, along a series of vectors perpendicular to the direction of traffic. The purpose is to weave urban activities and stitch across the highway separating Central City from the Superdome and New Orleans Arena, train and bus stations, and the commercial business district of the Loyola/Poydras Street area. To saturate the urban fabric, available spaces below, between, and above the interstate highways were claimed for new building sites, creating a large, horizontally layered mat structure capable of synthesizing the existing infrastructural landscape.

Layered Urban Topographies

Urban topographies attempt to displace the idea of buildings proposed for specific sites with the notion that the construction of the site itself as a large infrastructural project is perhaps a conflation

of architectural, urban, and geological attributes. Out of necessity, large infrastructural projects, such as highways, bridges, dams, and levees, do precisely this. Because they are dealing with large continuous systems, they operate at the geographical and urban scales. If Hurricane Katrina and the ongoing threat of flooding in an environmentally turbulent and disaster-prone area have affected the way we think about the urban environment in New Orleans, they are to remind us that the raising of an individual house is certainly not enough if there is no access, egress, or infrastructural support system ensuring life-sustaining continuities linking individual components within the larger urban system. The haunting image of post-Hurricane Katrina survivors stranded on rooftops being rescued by helicopters and boats is a reminder that raising houses independent of an elevated and accessible continuous infrastructural network or landscape and other methods of producing elevation within a discontinuous urban fabric are not sustainable solutions for the city's urban future. In low-lying regions, geography is an ever-present attribute of the urban environment, and we must therefore be thinking at the geographical scale through the manipulation of existing topographies while also thinking about the individual lot. The densely programmed artificial topography of piers (see exhibit 5) designed for Central City, for example, consolidates built space along raised extended avenues linked back to the high ground, while stacking aggregated housing units according to barcodes reinterpreting the historical urban patterns and rhythms of the existing streetscapes. URBANbuild generated high-, medium-, and low-density housing proposals, drawing from the specificity and spatial patterns of historic local models, such as existing shotgun

Exhibit 5

Rhythmic Urban Topography: Pier Strategy (1 of 2)

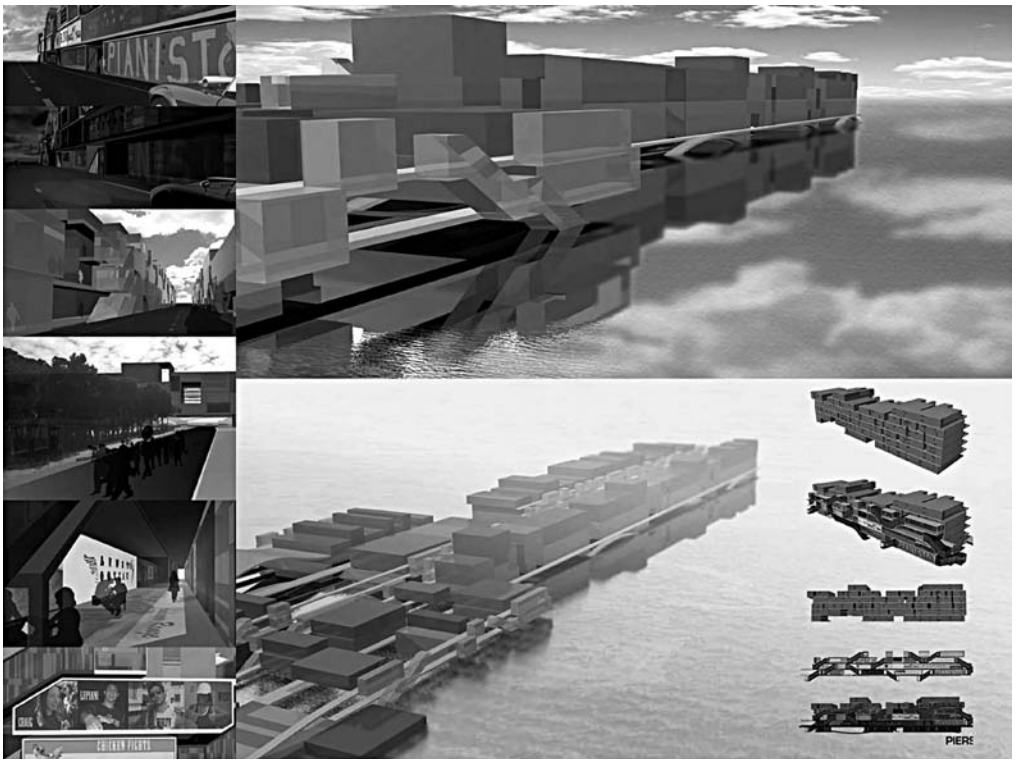
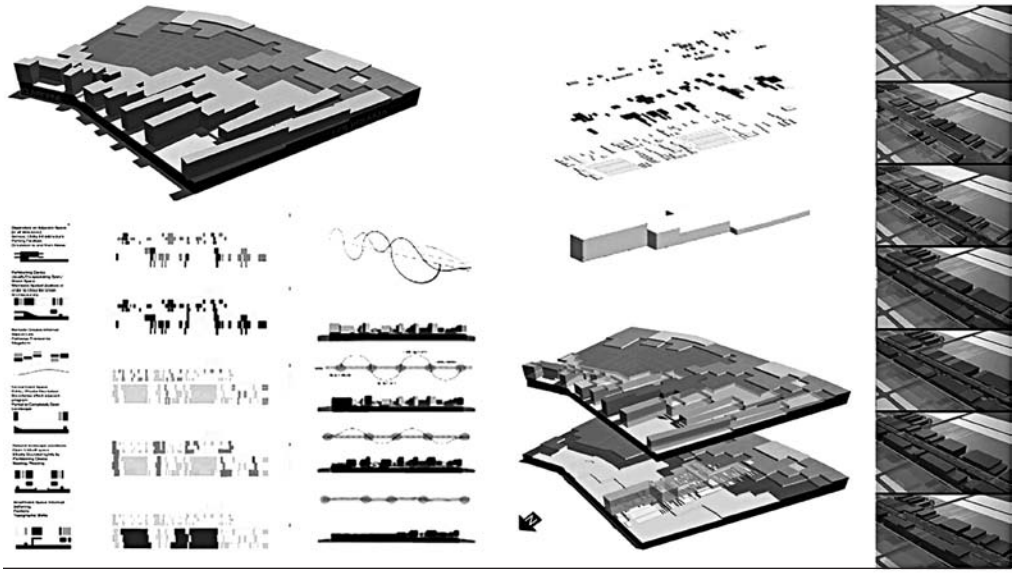


Exhibit 5

Rhythmic Urban Topography: Pier Strategy (2 of 2)



house types, which dominate the urban fabric in this part of the city, as well as from the study of important global models such as the innovative contemporary row-housing precedents developed for the reinhabitation of the piers and docklands in Amsterdam. These rhythmic topographies, which act as infrastructural urban islands connected by dry, elevated routes, achieve the requisite urban densities for these neighborhoods while shrinking the urban footprint and supporting the creation of recreational landscapes and sustainable "urban wetlands" within the interior of the city.

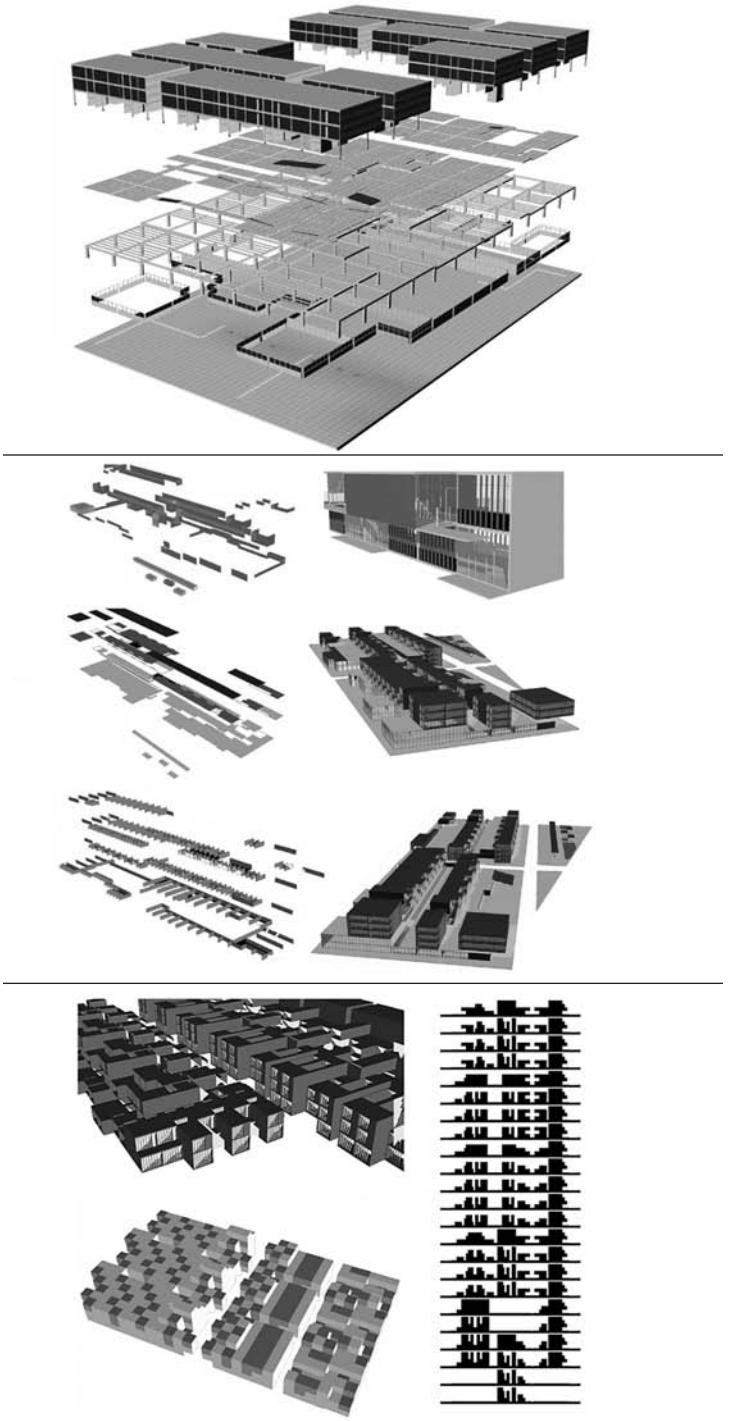
Architectural Aggregations

Megablock Strategies: HOUSING+

URBANbuild generated individual architectural proposals for the urban block through the concept of "HOUSING+," referring to housing in addition to other nonresidential mixed-use programs. HOUSING+ working, + leisure, + culture, + commerce, and + recreation represented an initial generic range of possible housing hybrids, which were rendered specific in relation to particular block sites (see exhibit 6). These programmatic and architectural design proposals were grounded in the study of several contemporary global housing precedents and the reinterpretation of these strategies in relation to new programs and local, site-specific urban, environmental, topographical, and cultural parameters. Many of these precedents were drawn from research of innovative social and economically mixed, high- and medium-density housing models from other watercities concerned with the application of contemporary models to historic fabrics, sustainable environmental systems, and cultural continuity. Models such as those used for Borneo Sporenburg in Amsterdam, for example, are contemporary, pedestrian-scaled, urban, three-story townhouse units based on historic canal houses (similarly subject to the threat of flooding), with base floor plan dimensions

Exhibit 6

HOUSING+: Three Proposals



that are surprisingly similar to the typical historic shotgun lot in New Orleans. URBANbuild analyzed these precedents at multiple scales to reveal their fundamental architectural principles and organizational strategies. We studied the deployment of these models in relation to larger urban systems; the complex configuration and variability of individual housing units; their modes of repetition, combination, and transformation when multiplied to produce larger building elements; and the methods through which different program types were integrated with housing to produce new hybridized programs combining living, working, and leisure.

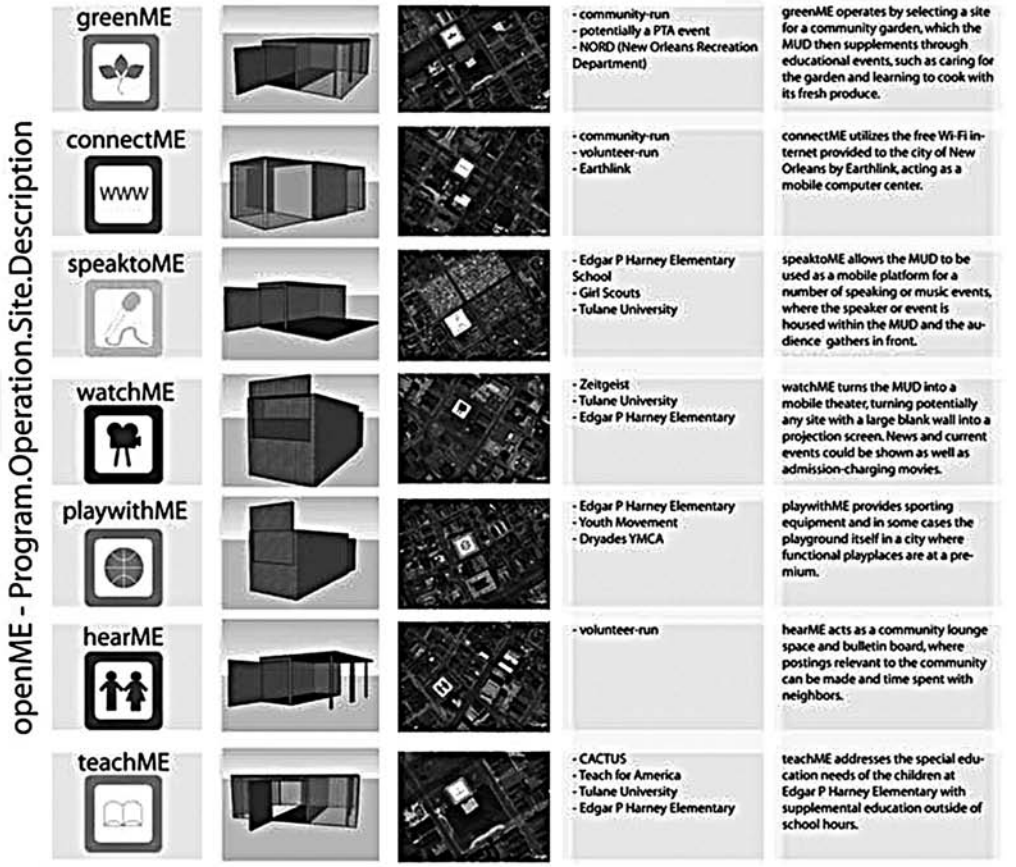
Housing proposals for the megablock focus on one of the most common urban units within the core of the city, which has historically determined the rhythm and structure of the urban fabric as a large-grained field. The reinterpretation of the urban block through architecture allows for multiple organizational tactics and architectural approaches to emerge within the boundaries of a single site, while negotiating between architectural and urban scales. The condition of repetition plus variation (the basis of rhythm) specific to the condition of housing within the block, which allows for individuation within the context of continuity, is therefore conceptually repeated at the urban scale as the accumulation of different proposals by multiple participants incrementally populate and fill out the larger urban terrain. In contrast to both the rigid repetition of historical typologies and monotonous homogeneity of mid-century American social housing projects, schemes revolve around flexible and variegated unit types, incorporating differing configurations of public and private programs and interior and exterior spaces, for a range of individuals and family structures and for a diverse population of inhabitants in terms of their economic, educational, and cultural backgrounds. These unit types, and the larger aggregates they form, represent an enormous taxonomical range of prototypical configurations that both evolve from and can be applied to differing sites. Multileveled perforated mat and rhythmic row schemes reinterpret the directional grain, internal configurations, and spatial deployment of site-specific buildings on adjacent and typological blocks, while increasing density and ensuring permeability to incorporate multiple uses of interior courts and roof gardens, in addition to allowing light, air, and greenery to penetrate deep into the block. The consolidation and activation of outdoor space both within the depth of and between rows and levels of units, which in typical shotgun lots is generally limited to a narrow, 3-foot right-of-way on either side of the building, engenders new models for spatial distribution of outdoor space within a single block and new possibilities for private and communal inhabitation. The framework for supplementary programs specific to different block sites and their vicinities also allows for different uses—from daycare centers, playgrounds, and recreational sports facilities to live-work studios, light industrial workshops, green markets, and commercial centers—to activate and revitalize these communities in support of architectural urbanity.

Microstrategies: Portable and Mobile Urbanism

URBANbuild housing-prototype development at the smaller scale investigated two distinct incremental strategies, both of which were intended to be inserted within existing neighborhoods as small-grained fields at the scale of the individual or collectively assembled lot. The portable and mobile urbanism studio focused on responding to the need for high-speed, high-quality urbanization, employing the power of individual settlement as well as the opportunities provided by flexible prototyping, prefabrication, and mass customization to implant existing neighborhoods with housing and community services designed and reconfigured for different urban situations (see exhibit 7).

Exhibit 7

Mobile Urban Device: Program Matrix and Community Network Strategies



Portable dwelling units (PDUs) and MUDs signify the private and public components of this urban system, to be understood not simply as individual houses or small community-outreach buildings, but rather as architectural elements able to accumulate into combinatorial urban patterns and networks that can accommodate the need for growth, expansion, and transformation over time, as well as spatial and contextual flexibility. In this context, the strategy of multiplying the effects of the extremely small urban component is to provide the maximum result, employing minimal means, and to establish a network of local community partnerships to act as program collaborators and potential sponsors. The goal is to move across scales and develop a series of architectural elements that will act as urban prototypes, which are able to satisfy urban and architectural needs simultaneously, given that the actual need for housing, as well as social infrastructure, is an urban issue as well as an architectural one. The importance of prefabrication and high-speed urbanism is to foreground the issue that although individual design-build projects are an extremely important contribution to this city, we have to realize that it would take URBANbuild students 30,000 years to build 60,000 housing units if we are building them only one house at a time. Solutions to large urban issues require larger scale urban strategies, even those that focus on the potential proliferation of small-scale architectural and urban elements. According to recent Census data, nearly 160,000 residents continue to be displaced from the center of New Orleans.[5] Many of these residents lacked the resources to evacuate and now remain stranded in temporary housing stock or in other parts of the country. Most of these low-income residents were renters, and a substantial number lived in federally subsidized and often dilapidated public housing projects. In addition, the settlement of temporary houses in the form of Federal Emergency Management Agency (FEMA) trailers has become a new problem for the city, because what was intended as a temporary solution has now become part of the permanent landscape of the city, exacerbating larger urban problems such as the need for public space, community services, and more stable urban conditions.[6] Because housing and social infrastructure are parallel needs in cities, the MUD and PDU—one public and the other private—are potential solutions to the need for incremental growth, economy, speed, and prefabrication that also deal with long-term development strategies for a consistent urban fabric that can operate at different scales and in different contexts.

Design-Build

URBANbuild house prototype and design-build studios focused on the immediate scale of the dwelling unit and its applicability for multiple sites within the target neighborhoods. URBANbuild students and faculty collaboratively designed five housing prototypes for each neighborhood, with

[5] See current resettlement statistics documented and analyzed by GCR & Associates (2007). According to GCR, in December 2007, the population of Orleans Parish reached 295,448—65 percent of its pre-Hurricane Katrina level of 454,863—bringing the total population of the metropolitan New Orleans area to 1,236,505. Further research includes data from the U.S. Census Bureau (2007) and statistics from the U.S. Postal Service (The Brookings Institution and Greater New Orleans Community Data Center, 2007a).

[6] See quarterly updates of *The New Orleans Index* supported by research from The Brookings Institution Metropolitan Policy Program and the Greater New Orleans Community Data Center, August 2007 and November 2007, at www.gnocdc.org (The Brookings Institution and Greater New Orleans Community Data Center, 2007b). Sources also include the Louisiana Recovery Authority. According to *The New Orleans Index*, in November 2007, more than 46,600 families continued to live in FEMA trailers across Louisiana, with 33,000 located in the New Orleans metropolitan area.

one prototype selected for construction in partnership with Neighborhood Housing Services, a community nonprofit agency specializing in affordable housing and neighborhood redevelopment. The program intended to provide high-quality affordable housing to aid in the immediate rebuilding of the neighborhood by generating a series of fully developed architectural construction drawings of low-cost, well-designed, environmentally responsive houses to be made available to qualifying families in the community. One of the many goals of this program is to contribute substantial and relevant proposals of progress amidst the preservation of an existing historic fabric. As a precursor to the design process, URBANbuild identified sites for development—in general, vacant lots and those containing severely damaged properties—analyzed them at the urban scale, and then selected specific sites to support design-build projects in consultation with Neighborhood Housing Services and other community partners such as Ujamaa, Project Home Again, and the New Orleans Redevelopment Authority who were all engaged participants in, and direct contributors to, the design-build process (see exhibit 8). Prototype designs investigated typical lot sizes and orientations within the neighborhood, repeatable programmatic and spatial typologies and their potential variations, and prefabricated and sustainable material construction components. This process enabled URBANbuild participants to understand the ways in which the designs for these prototypes might be systematically applied to the development of multiple sites within and across different target areas so that the architectural unit would be understood not simply as an individual

Exhibit 8

Design-Build Houses (1 of 3)

1930 Dumaine Street.

Exhibit 8

Design-Build Houses (2 of 3)

2856 Dryades Street.

built element, but rather within a larger urban context supporting this element's proliferation and multiplication. Of these designs, a single scheme and site were identified for development and construction by the collaborative design team within the studio, after which the proposal was documented and prepared for permitting and construction.

Although design-build projects cannot adequately deal with the scale and spectrum of larger urban issues, their importance as a strategy results from their physical material presence, their direct applicability, and the temporal and spatial immediacy of design-build practice. The physical object produced within this process becomes a local absolute that embodies within it the intellectual and physical labor of those who have contributed to its development, while the shared experience of each design-build project's development, renders hope and inspires action in those directly engaged in rebuilding the community. To date, the four planned design-build projects for URBANbuild—1930 Dumaine Street, 2856 Dryades Street, 1939 Seventh Street, and 1900 Seventh Street—have been successfully completed in the Upper Treme and Central City neighborhoods. Each of these projects has attempted to respond to larger urban and environmental issues at the local scale, such as the necessity for both flood protection and connectivity, as well as the incorporation of sustainable and repeatable practices, while reinterpreting the cultural, social, and

Exhibit 8

Design-Build Houses (3 of 3)

1939 Seventh Street.

economic needs of the community through innovative design and construction strategies. These projects have acted as vital loci for redevelopment in their neighborhoods, initiating and sustaining an ongoing dialogue about the potentials of active, local practice for transforming communities.

This spectrum of urban proposals and architectural projects of the URBANbuild program attempts to negotiate between the history and the future of New Orleans—not only the city's 19th-century architectural history, but also an expanded notion of history that includes its deep geological and environmental history; its social, cultural, and programmatic history; and its more recent industrial and technological past. This process is grounded in extensive collaborative research and developed through a network of interconnected active practices that speculate on potential new urban trajectories for the future development of this city that embody the principles of architectural density, diversity, and sustainability. URBANbuild proposals for a variety of mixed-use, higher density housing models (for example, that counter the opposition of single family homes and larger scale monotonous housing "projects" typical of New Orleans and many other American cities) are intended to challenge the limited frame of existing typologies that have predetermined the city's growth and urban development, as well as the typical patterns of its environmental consumption, while offering new propositions to expand the terrain of "real" possibilities in relation to the city's rebuilding.

After Hurricane Katrina, it is important that the evaluation of opportunities for, and threats to, this city take place within an expanded analytical framework, where invention is supported within the context of historical continuity and environmental responsibility and local culture is respected within a diverse and more global urban context. As Elaine Scarry (1987) made evident in her book *The Body in Pain*, we continually remake the world in order to remake ourselves. Our cities are not just sites of projection of our own living sentience, they are also sites of reciprocation—worlds that have the capacity to transform the lives of those who make, encounter, and inhabit them.

Acknowledgments

The author sincerely thanks the many contributing faculty, staff, students, and community partners of URBANbuild for their collective leadership of, and unwavering commitment to, the goals of the URBANbuild program. Its success is a direct result of the strength of an immense collaborative effort, and the author is indebted to the many individuals at Tulane University and in the New Orleans community and to those in the U.S. Department of Housing and Urban Development, Office of University Partnerships, who supported this program and made this work possible.

Author

Ila Berman is director of the School of Architecture at the California College of the Arts, the founder and director of URBANbuild, and principal of Studio Matrixx.

References

The Brookings Institution and Greater New Orleans Community Data Center. 2007a. *The New Orleans Index. Addendum: Updated population statistics from the U.S. Postal Service (August 23, 2007).*

The Brookings Institution and Greater New Orleans Community Data Center. 2007b. *The New Orleans Index: Tracking the Recovery of New Orleans & the Metro Area*. www.gnocdc.org (accessed August and November 2007).

Campanella, Richard. 2006. *Geographies of New Orleans: Urban Fabrics Before the Storm.* Lafayette, LA: University of Louisiana at Lafayette, Center for Louisiana Studies: 369–380.

GCR & Associates. 2007. *Resettlement Trends: December 2007 Population Update* and *Population Update: GCR Releases Population Estimate for December 2007*. http://www.gcr1.com/resettlement_trends_ december07.htm (accessed December 2007).

Lacan, Jacques. 1977, 1989. *Ecrits.* London: Tavistock/Routledge.

Lewis, Pierce F. 1976. *New Orleans: The Making of an Urban Landscape*. Cambridge, MA: Ballinger.

Louisiana Recovery Authority. 2007. *Moving Beyond Katrina and Rita: Recovery Data Indicators for Lousiana.* http://www.lra.louisiana.gov/ (accessed August 2008).

Scarry, Elaine. 1987. "The Interior Structure of the Artifact." In *The Body in Pain: The Making and Unmaking of the World.* New York: Oxford University Press: 278–327.

U.S. Census Bureau. 2007. *U.S. Census Bureau 2007 Population Estimates*. http://www.census.gov/popest/estimates.php (accessed August 2008).

———. 2005. *American Housing Survey for the New Orleans Metropolitan Area: 2004. Current Housing Reports*. U.S. Department of Housing and Urban Development, Office of Policy Development and Research and U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau.

———. 2002. *Louisiana: 2000, Summary Population and Housing Characteristics*. U.S. Department of Commerce, Census Bureau.

Rebuilding for the Seventh Ward's Cultural Life

Rob Corser
University of Washington

Nils Gore
University of Kansas

Abstract

This article describes an ongoing collaboration between the University of Kansas School of Architecture and Urban Planning and the Porch 7th Ward Cultural Organization following Hurricane Katrina. The aim of the project is to assist in community rebuilding and empowerment by highlighting the cultural legacy of this historic New Orleans neighborhood. The project also serves as an investigation of new approaches to design assistance and design-build pedagogy.

Introduction

The Seventh Ward neighborhood rebuilding project in New Orleans, led by professors Rob Corser and Nils Gore of the University of Kansas, consists of a series of targeted community design-build projects intended to assist our client, The Porch 7th Ward Cultural Organization (The Porch), a fledgling neighborhood group, in its efforts to build community cohesiveness in the Seventh Ward following the devastation that Hurricane Katrina brought to their community. An ongoing experiment in providing collaborative, community-centered, design-build assistance without the benefit of proximity, the project is in its sixth semester and is expected to continue indefinitely. The design collaboration started as a grassroots effort through a meeting of neighborhood residents and architecture students facilitated by a weekend conference held at the University of Arkansas in December 2005. It is further facilitated by ongoing participation in the CITYbuild Consortium of Schools, which provides local support and coordination. It is funded by student-solicited individual and institutional donations totaling more than $35,000 to date.

The Seventh Ward maintains significant vestiges of the physical and cultural richness of Creole culture, and, from the start of the university's work with The Porch, neighborhood residents made clear that they wanted to control the destiny of the neighborhood. They wanted additions to the

neighborhood to be contextually relevant, and they explicitly stated that new designs should be cognizant of the African roots of Creole architecture and should celebrate those roots.

The following narrative describes the first community structures built in the neighborhood following the hurricane. They are intended to serve as a tangible presence of The Porch as it reaches out to residents. The following five projects serve as critical infrastructure for building up this community organization:

1. Notice boards: a means by which information can be disseminated throughout the neighborhood.
2. Community garden shade pavilion: a public gathering place for community events.
3. Community garden tool shed: a tool-lending library for promoting gardening activities throughout the neighborhood.
4. Mobile stage: an outreach tool for arts and cultural activities in the neighborhood.
5. Outdoor classroom: a learning space for cultural education.

Context and Design Approach

The Porch focuses on physical rebuilding and sociocultural empowerment in the lower portion of the Seventh Ward. The residents of this district, which is mostly African American (94 percent, according to the 2000 Census), have experienced a history of inadequate education, high unemployment, and disinvestment, which resulted in the presence of numerous blighted properties even before Hurricane Katrina came ashore. According to the 2000 Census, 77 percent of households were renters and the median income was $12,459. Among adults over age 25, 52 percent did not have a high school diploma. Other preexisting neighborhood conditions included a high crime rate and a lack of community resources. Members of the community expressed new concerns about the possibility of socially disruptive gentrification and a growing lack of community cohesion in the wake of the hurricane.

The community's initial goals focused on the desire to reknit the neighborhood's social fabric, raise its level of self-sufficiency, and increase neighborhood pride. Both the residents and the design team recognized that the Seventh Ward is a neighborhood rich in cultural traditions, including those of jazz music, Creole building crafts, and Mardi Gras Indian tribes. An important aspect of The Porch's and the university's collaborative rebuilding effort is maintaining and promoting these cultural traditions. The design team's preliminary approach was to focus on numerous small structures, strategically seeded throughout the neighborhood, rather than try to develop a central or larger single project. The collaborative group determined that targeted design efforts would be best able to support and promote The Porch's mission of informing and educating residents, harnessing social capital, and improving the neighborhood. As professors of architecture working 1,000 miles away from the site, we knew it was important that the projects be of a scale that students—most of whom had limited building experience—could achieve within the course of a semester. Thus the idea of seeding the neighborhood with small interventions, produced over time and placed according to community need, made sense for both the students and their neighborhood partners.

As teachers, we believe that the idea of reciprocity between the Seventh Ward residents and our students is vitally important. Although university students and faculty are represented as helpers in recovery, the residents are also helping the university's design team members become better architects and learn about how design can support community vitality at a variety of scales. An important aspect of personal and cultural exchange also exists in this ongoing relationship. In addition, the project aims to promote skills in direct social action among the architecture students, who take full responsibility for neighborhood collaboration, fundraising, design, construction, transportation, and long-term performance of their projects. Students and neighborhood residents alike report finding themselves bound in an expanded sense of community.

In the initial phase of building, conducted between January and May 2006, the design team made four separate trips to the neighborhood and completed the installation of a series of public notice boards, a covered gathering space, and a tool storage facility for a community garden. In the fall of 2006, students constructed a mobile stage. In the spring semester of 2007, the students completed an outdoor classroom to support the Neighborhood Housing Services of New Orleans' development of the new 7th Ward Community Center, which includes a permanent home for The Porch Cultural Organization. This open and flexible structure allowed youth programs to be held at the new community center while the building was undergoing renovation. Additional projects completed in the fall of 2007 have focused on furniture and other installations to make the new community center building more useful for programs of all types. In the spring of 2008, another shade pavilion was installed at a new community garden adjacent to the community center to support The Porch's ongoing efforts to reach out to residents of the Seventh Ward.

Catalogue of Projects Undertaken to Date

The projects illustrated here are all part of an ongoing exploration of a unique approach to design-build pedagogy. In collaboration with The Porch, faculty and students have worked for the past 3 years to develop a form of practice that combines community engagement, design, fabrication and performance in new ways. This work has been described as a form of "guerilla architecture" because it consists of "small-scale interventions in the social and urban landscape…intended as an immediate and inexpensive way of satisfying the needs of a specific group" (Fontenot, 2007: 99). Due in part to the more than 1,000 miles separating the shop and the worksite, we have always focused on lightweight and flexible solutions that can have the widest, and sometimes most unexpected, benefits for the community. What is emerging is a tactical approach, aimed at meshing more productively with the everyday life of neighborhood residents. This commitment to a single neighborhood and community partner inserts students in a rich social milieu and relates their work to that of others in a temporal continuum that challenges the singularity and hermetic focus that is too often the nature of architectural practice and design-build pedagogy.

Notice Boards

The notice board project was the trial run of the university's long-distance design-build experiment (see exhibit 1). The community wanted to have some means to communicate. Pedagogically, the notice board projects provided a good skill-building opportunity and a means for testing initial prefabrication and transportation ideas. The boards were completed in February 2006, and since

Exhibit 1

Notice Board Project

Notice board, freshly installed in the community. Photo credit: Nils Gore.

then the Neighborhood Story Project and the University of New Orleans have developed a series of posters highlighting the creative and cultural contributions of residents of the Seventh Ward for installation on the notice boards. Two of the notice boards have also been moved around the neighborhood to support a mobile art exhibit.

Community Garden

In the spring of 2006, 6 months after Hurricane Katrina wreaked havoc on the neighborhood, a local community garden group, Parkway Partners, offered The Porch use of a derelict site on North Robertson Street. Residents and students focused on making useful structures for gardening, social, and educational activities. A group of third-year students studied and adapted vernacular wood framing and developed a shade pavilion using primarily digital design and computer numerically controlled (CNC) fabrication (see exhibit 2). Concurrently, a group of fourth-year students studied African vernacular and textile precedents as a foundation for their design of a steel-framed, wood-skinned tool shed that they fabricated using a hybrid of digital and manual techniques (see exhibit 3). Both projects were prefabricated and installed in New Orleans in early May 2006. A second version of the shade pavilion was constructed in the spring of 2007, and, after exhibition at the Cooper-Hewitt National Design Museum, it was recently installed in a new community garden in the Sevevth Ward.

Exhibit 2

Community Garden Project: Shade Pavilion and Tool Shed

The shade pavilion is in the foreground and the tool shed is beyond it, to the left. Photo credit: Lauren Keefer.

Exhibit 3

Community Garden Project: Tool Shed

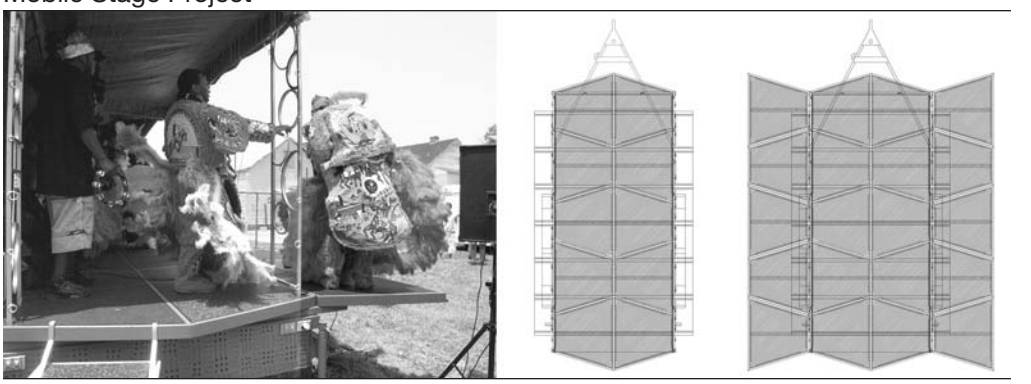
The tool shed roof, with delicately patterned, incised wall panels, inspired by African textiles. Photo credit: Nils Gore.

Mobile Stage

The idea for the mobile stage project grew out of the desire for The Porch to have a venue for public events such as block parties, neighborhood festivals, and parades. Built on the platform of a common 14-foot utility trailer, the stage's 8.5- by 16-foot fixed deck features hinged panels that can open to make a flat stage surface of 13 by 16 feet or can be fixed in a vertical position for parades (see exhibit 4). An overhead frame structure provides support for backdrops and overhead shading in a variety of configurations. Two people can fully deploy the stage in about 10 minutes. Completed by a group of fourth-year students in the fall of 2006, the mobile stage was delivered to New Orleans in January 2007. Since then, The Porch has used the stage for numerous events and has lent it to community organizations in other neighborhoods.

Exhibit 4

Mobile Stage Project



Mardi Gras Indians performing on mobile stage. Photo credit: Nils Gore. Mobile stage plan drawings, closed (left) and open (right).

Outdoor Classroom

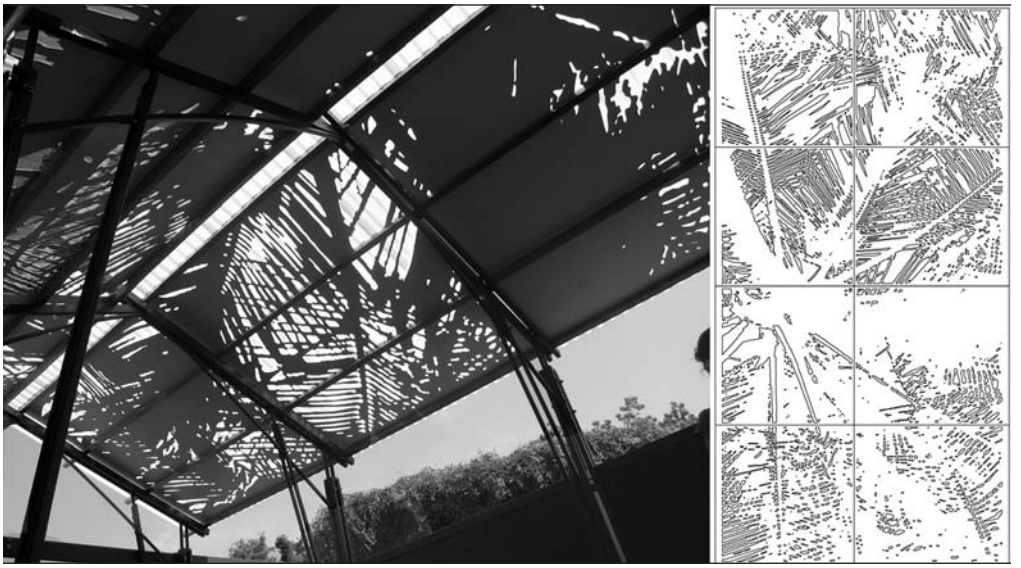
The outdoor classroom is the first new permanent construction at the site of the 7th Ward Community Center. The building will be shared by The Porch 7th Ward Cultural Organization and the Neighborhood Housing Services of New Orleans. The classroom encloses a space of about 10 by 20 feet and consists of five steel structural frames covered with a roof constructed of wood purlins and a perforated layer of CNC-cut palm frond patterns beneath a top layer of corrugated polycarbonate panels (see exhibit 5). Walls feature fold-out benches, chalkboards, patterned metal mesh panels, and rolling gates. Fourth-year students designed and built the classroom and installed it in May 2007. The community center began to use it immediately for a summer children's art program.

Challenges

The major challenge for the university in facilitating these projects has been working with a neighborhood group across a tremendous physical distance. Although the interaction is primarily by e-mail and telephone, university participants take a series of trips to the neighborhood each semester. Both designers and neighborhood residents prepare thoroughly for these encounters,

Exhibit 5

Outdoor Classroom Project



View looking up into the outdoor classroom roof. Photo credit: Nils Gore.

Note: The drawings are computer-generated abstractions derived from a photograph looking up into a palm tree. Those drawings direct a computer-controlled router to cut the patterns in the roof.

because they are limited both in number and duration. During these meetings, participants establish a general understanding of the current project parameters. Following initial meetings in New Orleans, the design team returns to the university to begin work on design and construction ideas. During the design process, the team sends drawings and images to the neighborhood clients for review and feedback. They also publish the drawings and images on an open-source "Wiki" site, which is a repository for project and neighborhood images, project data, text, and links to useful information from other websites. This site has become the public face of the project. It is the primary means of sharing the team's experiences with the Seventh Ward and the university's relationship to the wider academic and design community in the context of Gulf Coast redevelopment and disaster recovery.

One of the key programmatic activities of all the projects undertaken thus far is communication. The notice boards were intended to facilitate immediate communication after the storm; the community garden is a place for neighbors to gather for conversation and other meetings; the mobile stage brings the words and sounds of the Seventh Ward's artists to various locations; and the outdoor classroom houses instructional communication. Further, the structures themselves are designed to communicate subtle messages ranging from the visual sturdiness of the shade pavilion to the delicate imagery, inspired by African textiles, that is incised in the tool shed's wall panels. Each element of these ongoing projects embodies some form of patterning or visual message that speaks about New Orleans, the Seventh Ward, and our client, The Porch 7th Ward Cultural Organization.

Conclusions

The Seventh Ward neighborhood rebuilding projects in New Orleans, led by the University of Kansas, consist of a series of targeted community design-build projects that test the viability of remotely collaborating with a neighborhood group by leveraging digital design, communication, and fabrication in conjunction with other, more standard, approaches, including the facilitation of CITYbuild. Another area of investigation, not explored in this profile, is the development of intelligent construction systems that combine digital and manual fabrication techniques to explore new approaches to "flat-pack" construction. In this ongoing pedagogical experiment, students and neighborhood residents are exploring and extending their own horizons in terms of collaboration, design, and construction through the social and cultural dimensions of community-based design.

Acknowledgments

The authors thank all the generous individuals and organizations who have contributed time, money, love, and commitment to this effort, and we deeply regret that we have insufficient room to name each of them. The University of Kansas School of Architecture and Urban Planning has greatly supported us beyond normal expectations. The Porch 7th Ward Cultural Organization is the most wonderful collaborator any architect or teacher could hope for, and the CITYbuild Consortium is a great source of logistical help and collegial feedback. We have benefited directly from monetary and/or material donations from the Kemper Foundation and the Kuhn Foundation, both of Kansas City, Cottins Hardware, Schutte Lumber, Yemm and Hart, and Roseburg Forest Products. Finally, we acknowledge the fine spirit of generosity, hard work, intelligence, and enthusiasm our students brought to this project—without them, none of this would be possible.

Authors

Rob Corser is assistant professor at the University of Washington, Department of Architecture. Until the spring of 2008, he was assistant professor at the University of Kansas.

Nils Gore is associate professor at the University of Kansas, Department of Architecture.

Reference

Fontenot, Anthony. 2007. "Reinventing New Orleans," *DOMUS* 905 (July-August): 95–99.

Rebuilding New Orleans With Affordable, Hurricane-Resistant Residential Construction

James Goedert
University of Nebraska–Lincoln

Abstract

This article describes a project in which the overall objective was to provide information and designs for the rebuilding effort in New Orleans following the city's destruction by Hurricane Katrina in August 2005. More than 250,000 houses were damaged in New Orleans—100,000 beyond repair. The University of Nebraska–Lincoln teamed with Catholic Charities of the Archdiocese of New Orleans to work with residents in the Tremé/Lafitte neighborhoods of Orleans Parish to rehabilitate, construct, and reconstruct their homes. Three objectives of the project were to (1) develop a rehabilitation manual; (2) design 10 new affordable house designs with 10 variations, for a total of 20 new designs; and (3) capture the designs of 10 houses to be demolished and rebuilt.

Introduction

Residential housing in the city of New Orleans was severely affected when Hurricane Katrina made a direct hit on the city on August 29, 2005. The devastation of the 100-miles-per-hour winds and torrential rain was dwarfed by the subsequent destruction caused by levee breaks in four locations throughout the city. Todd Richardson, the U.S. Department of Housing and Urban Development's (HUD's) deputy director of Program Evaluations Division, called Hurricane Katrina the most disruptive hurricane recorded in terms of financial damage. Estimates indicate that more than 250,000 houses were damaged in New Orleans,100,000 beyond repair (Angelo and Bergeron, 2007). Nearly 1 year after the hurricane, the population of Orleans Parish had decreased from more than 450,000 to less than half that number (U.S. Census Bureau, 2006). With more than 75 percent of Orleans Parish uninhabitable, an immediate need existed for low-cost permanent housing. Many houses could be rehabilitated, while others required complete rebuilding.

The problem of rebuilding the city was exacerbated by a number of factors, including political pressures from opposing constituencies, the inflated cost of construction, an unskilled workforce, the lack of qualified building inspectors returning to work, and a number of building code issues. Political pressures include the issues regarding various approaches to dealing with some of the worst concentrations of poverty in the country. Before Hurricane Katrina unleashed her destruction, 27.9 percent of Orleans Parish residents lived below the poverty level, according to the U.S. Census Bureau (2000). Cochran (2005) described New Orleans as socially dysfunctional, indicating the need to "rebuild both the infrastructure and the social fabric." Many residents and organizations thought the storm provided the perfect time to eliminate the more blighted areas of New Orleans, especially those neighborhoods close to downtown and the French Quarter, and replace them with new homes attractive to middle- and upper-income families. Others believed that those neighborhoods needed protection to preserve their history and integrity as well as to avoid exploiting the disadvantaged residents who had suffered the most because of this tragedy. Some individuals and groups expressed "concern that gentrification of New Orleans will occur that economically forces its lowest-income residents from the city" (USGBC, 2005: 5).

The demand for builders far exceeded the capacity of local industry and resulted in inflated construction costs. Outside contractors were finding Orleans Parish a difficult environment in which to work. City officials were hesitant to recognize these nonresident entities as legitimate constructors. Officials knew what to expect from local builders with whom they shared a relationship but were uncomfortable with the fast pace of activity and the lack of qualified inspectors to ensure code compliance. In addition, construction money was slow in coming.

Building codes have change dramatically from when many of these neighborhoods were first built. Some neighborhoods are more than 100 years old and were in desperate need of upgrading. For example, many New Orleans homes had been built with barge board lumber stacked vertically side by side for both exterior and interior walls. Barge boards are oversized, rough-sawn lumber, 3 by 12 inches. Siding had been applied to the outside, and gypsum wallboard or plaster to the inside. Raw materials were shipped from the north down the Mississippi River to New Orleans on barges. Once the raw materials were unloaded, the barges were dismantled and sold as barge boards for construction. Although very effective at the time, this method is now extremely inefficient in terms of materials and subsequent energy conservation when compared with current standards.

Other building code issues that put city officials at odds with neighborhoods included the issues of setback standards and off-street parking. The New Orleans Comprehensive Zoning Ordinance (Matthew Bender and Company, 2007) indicates residential setback standards are 20 feet from the street and 3 feet from the side lot line. Houses that require more than 50 percent of their market value in rehabilitation cost or need to be entirely reconstructed must meet the new building code or acquire a variance. Anyone who has ever visited an older New Orleans neighborhood with houses that have front doors opening onto the sidewalk and, in some cases, have zero clearance between neighboring houses, can understand how meeting the new setback requirements may be difficult.

Even if city officials granted a variance for the setbacks, allowing the new house to match existing houses, a number of other issues needed to be resolved. New building codes require off-street parking. In addition, the new base flood elevation (BFE) would require the new house to be 3 feet

above the highest existing adjacent grade (FEMA, 2006). Thus the entry steps and the required landing would extend out onto the sidewalk and possibly the street. It quickly became clear that more problems than solutions existed, resulting in the ensuing gridlock regarding the inner city.

Project Description

The project for the Tremé/Lafitte neighborhoods in Orleans Parish of New Orleans was a partnership between the University of Nebraska–Lincoln (UNL) College of Engineering and Catholic Charities of the Archdiocese of New Orleans (CCANO) to develop protocols for the rehabilitation effort and to test them on 10 units, to create 20 new designs, and to capture the unique designs of 10 existing neighborhood houses before they were demolished. The partnership disseminated the material developed during the course of this project via a website (University of Nebraska, 2007), making it available for others during the reconstruction effort. The posted information included protocols for the rehabilitation portion of the project and an actual rehabilitation manual, reconstruction drawings and details, and new construction design drawings and details.

University-Community Partnership

The author heads the construction engineering and management programs at UNL and is the principal investigator for the project. Several faculty members in the Construction Engineering and Management programs were involved, as were a number of students, some of whom were employed during the project. To involve a larger number of students, the university designed the project to be used in a sophomore-level course as a design project and in junior- and senior-level courses as an analysis project. UNL conducted the research, provided the designs, and distributed the information. The partnership with CCANO was the result of discussions between the author and CCANO for this specific purpose. CCANO acted as the owner's representative organizing design charrettes with local builders, reviewing the designs at various stages, and suggesting modifications. CCANO also worked with the volunteers and managed the operations on location.

CCANO is an umbrella agency of approximately 33 social and health services programs located throughout the Archdiocese of New Orleans. It works with a nonprofit entity called Providence Community Housing (Providence) whose mission is to "foster healthy, diverse and vibrant communities by developing, operating and advocating for affordable, mixed-income housing, supportive services and employment opportunities for individuals, families, seniors and people with special needs" (Providence Community Housing, 2007). Charlotte Burgeous, of CCANO, and Deacon John Ferguson, of Operation Helping Hands, were instrumental in coordinating these efforts.

The Sixth Ward, also known as the Tremé and/or Lafitte neighborhoods, was the focal point of the project, with some activity in the Seventh Ward and Bayou St. Johns. The Tremé/Lafitte neighborhood is north and west of the French Quarter and included some of the most blighted areas in New Orleans. Bayou St. Johns is the adjoining neighborhood to the northwest. St. Raymond's Church is in the Seventh Ward or Gentilly neighborhood just north and east of the Tremé/Lafitte neighborhood and was the headquarters for Operation Helping Hands.

Strategies

The project used three strategies: (1) rehabilitation, which refers to damaged houses that were repairable; (2) reconstruction, which refers to houses damaged beyond repair but that would be rebuilt similar to their original design and layout; and (3) construction, which refers to new house designs. The objective of the rehabilitation strategy was to create and refine a rehabilitation protocol manual by working with CCANO on 10 housing projects, implementing lessons learned. The objective of the reconstruction strategy was to capture the designs of 10 houses beyond repair and incorporate the affordable, environmentally resistant features into a set of construction documents. As part of this strategy, the team disseminated information in the form of construction drawings for actual reconstruction. The objective of the construction strategy was to develop 10 sets of new drawings and 10 variations for CCANO to help its constituencies build new homes that would incorporate the affordable, environmentally resistant features. The team also disseminated information for this strategy in the form of construction drawings for use by owners and home builders. The policy and procedures manuals, the construction drawings, and the reconstruction drawings were made openly available on the Internet. The drawings are available for download in .dwg format for AutoCAD and .pdf format for Adobe Acrobat.

Rehabilitation Strategy

Rehabilitation often included the complete removal of all but the basic structure. Wall cavities were especially prone to mold if exposed to moisture for any length of time. Plaster and gypsum wallboard were often damaged beyond repair if exposed to flooding for even a short time. Interior damage also resulted from broken windows and damage to roofs. The result was, in many cases, that the cost to rehabilitate a house was more than the cost of reconstruction. For some residents, the decision to rehabilitate in spite of the economic disadvantage was more about the psychological effect of returning to normalcy. It meant getting their life back. Other more pragmatic reasons to rehabilitate included unacceptable building code restrictions associated with new construction such as off-street parking and setbacks. Subsequent sections of this article address this issue in more detail.

Deacon John Ferguson from CCANO, a seasoned builder, craftsman, and organizer, directed Operation Helping Hands' efforts. Through this organization's efforts, volunteers and staff completed the interior demolition and cleanup of more than 2,000 houses in 2 years. The schedule for federal government-funded waste pickup created urgency in completing the demolition within the prescribed time period. About 20 percent of these houses are now rebuilt with numerous others partially completed.

Deacon Ferguson developed the protocol manual that was later revised by Paul Cook, his successor, to help with the efforts at Operation Helping Hands. Protocols were necessary to minimize the risk to volunteers who sometimes worked in harsh, if not toxic, environments. Contractors were needed to do much of the repairs, unless the organizations were fortunate enough to find skilled volunteers. Many homeowners, however, lacked the financial means to complete the rehabilitation. Receipt of insurance, state, and federal money, including funds from the Road Home program, was delayed and the amounts were often inadequate in light of inflated labor and materials prices.

CCANO and Providence had access to titles on 9 duplexes, or 18 units, on one block located between St. Peter Street and Orleans Avenue in the 2800 block, as shown in exhibit 1. The project team selected these duplexes as the test case because, first, the impact on the neighborhood of rehabilitating an entire block was more substantial when compared with 10 scattered site units and, second, the units were in different, yet similar, stages of disrepair and made an excellent sample for comparison. The project team developed a rehabilitation strategy and program for the 18 units using information from Operation Helping Hands and independent research.

Exhibit 1

Duplexes on St. Peter Street: A Test Case in Orleans Parish, Louisiana

A northwest view on the 2800 block of St. Peter Street, in the Tremé/Lafitte neighborhoods of Orleans Parish. Photo credit: James Goedert.

A project management plan for each duplex, including a repair list, schedule, estimate, and protocols for incorporating hurricane-resistant features, was delivered to Providence to rehabilitate the units. The photo in exhibit 2 portrays a typical duplex unit; note the water line that is visible on the fourth row of siding. The project team posted one of the nine manuals that Deacon Ferguson developed for the individual properties on the web. The information this manual is useful for others attempting similar efforts. For example, a big concern associated with cleanup includes exposure to mold and other toxins during the demolition process. The manual describes the necessary precautions and recommends mold remediation products and sealants to prevent mold from returning.

Another concern in rehabilitating houses was how to develop a load path through the structure. Exhibit 3 shows the load path through the structure of a typical house from the *Coastal Construction Manual* (FEMA, 2005). The load path indicates eight links that tie the structure together from the roof to the foundation. Link one is the roof sheathing to the rafters. The original wood shingles were covered by asphalt shingles, which is typical of many of the older homes. The sheathing beneath the wood shingles is 1- by 6-inch boards with 1-inch spacing between boards to allow

Exhibit 2

Hurricane-Damaged Duplex Home in Orleans Parish, Louisiana

A typical duplex unit in the Tremé/Lafitte neighborhoods in Orleans Parish, with the water line from Hurricane Katrina flooding visible on the fourth row of siding. Photo credit: James Goedert.

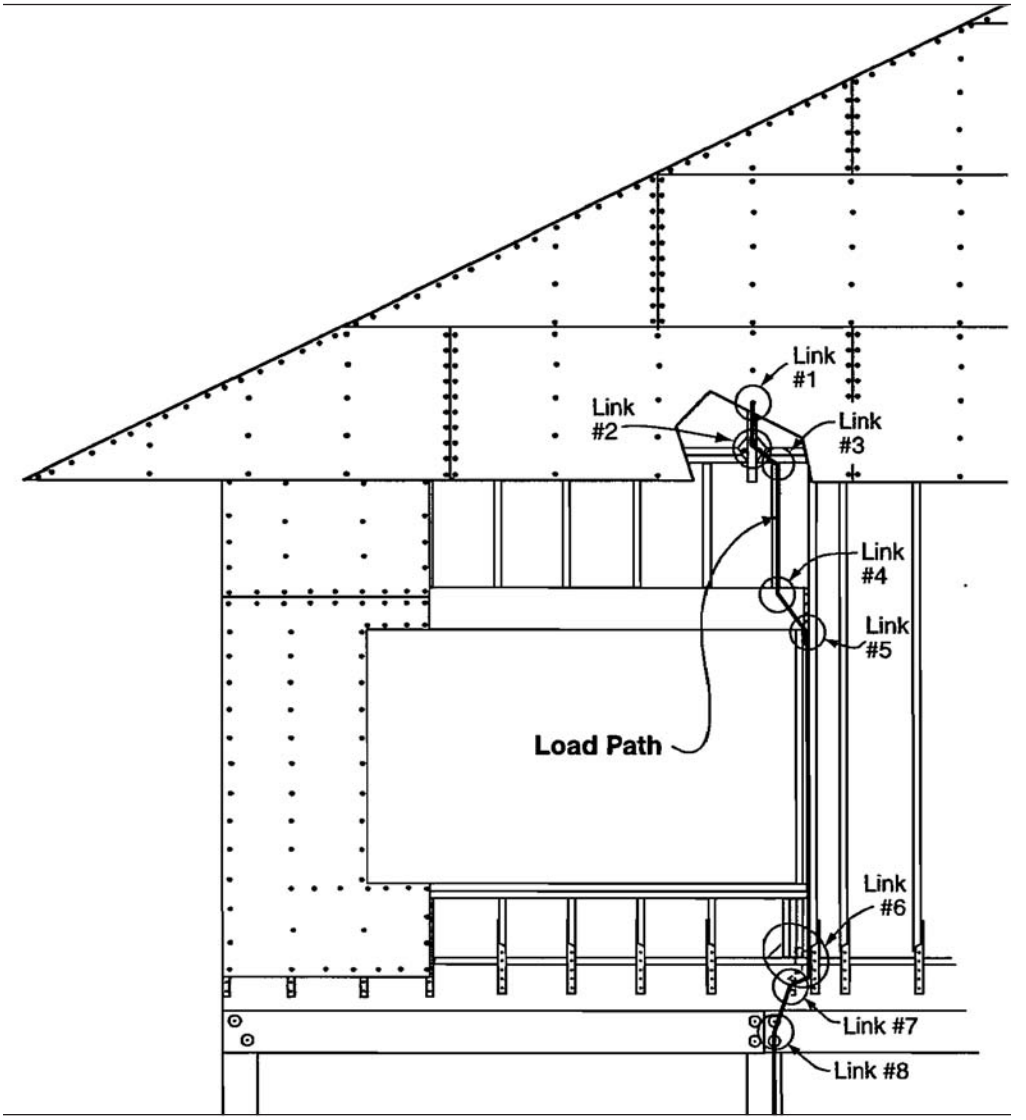
airflow through the wood shingles. During rehabilitation, the builders removed the shingles and installed 7/16-inch sheathing with 8d nails every 12 inches in the field and 6 inches along the edges.

Links two through seven were more problematic because the wall siding and roof sheathing on the outside and the plaster walls on the inside concealed them. The water damage from flooding was to the bottom 12 inches or slightly more on the interior walls. Other water damage caused by the winds varied depending on the extent of the roof damage. Although access to the structure at the rafter-to-plate-to-stud connection was necessary to install the proper brackets to maintain the load path, the installation could be accomplished from the interior or the exterior. The project team decided it would be easier for the builder to access the structure from the interior because (1) the siding and exterior sheathing were intact and could be repaired and repainted, (2) the roof sheathing would also need to be removed for a few feet up along the eve and then replaced if the links were accessed from the exterior, and (3), given the extent of the interior water damage, the bottom 4 feet of the drywall was already being removed and replaced as was the ceiling damage. It was more practical to gut the interior and mount the appropriate brackets to the exposed structural elements from the inside and replace all the drywall.

The city declared the damage to the properties in excess of 50 percent. This is the threshold for structures that must meet the new BFE. According to the Federal Emergency Management Agency (FEMA), "The BFE refers to the elevation associated with the "100-year flood, or it is a flood with a 1-percent chance of occurrence in any given year" (FEMA, 2007: 1). Flood insurance rate maps

Exhibit 3

Load Path Diagram From the *Coastal Construction Manual* (Figures 12–15)



show the BFE for a given location. It is necessary to build above the BFEs to be eligible for the National Flood Insurance Program and FEMA funding for some recovery projects. These units had to be raised to install new foundations that meet the new standards. Some homeowners could apply for up to $30,000 to elevate their homes through their flood insurance programs. The eighth and final link occurred by attaching the new foundation to the structural beam. All remaining repairs were standard practice and required no special accommodations. Exhibit 4 shows one of the duplexes on this block nearly rehabilitated.

Exhibit 4

Rehab in Progress

A nearly rehabilitated duplex in the Tremé/Lafitte neighborhoods in Orleans Parish. Photo credit: James Goedert.

Reconstruction Strategy

New code requirements such as setbacks and off-street parking, previously discussed in the rehabilitation section, prevented a number of houses from being reconstructed. Other houses met the requirements. For example, the duplex photographed in exhibit 5 was designed for reconstruction. The project team captured the original floor plans of each house before the city demolished the duplex. A number of modifications were suggested to make the living space more comfortable and a little more modern.

Most of the houses selected for reconstruction were designed as a "shotgun" floor plan due to the limited and narrow lot sizes. The shotgun has each room lined up behind the next with no hallway, thus maximizing the space. This style is well known in New Orleans, and the name originated from the notion that one could shoot a shotgun through the front door out the back door. Homeowners were soon discouraged with reconstruction when faced with an opportunity to work from a blank slate. The team selected nine houses as candidates for reconstruction. The floor plan shown in exhibit 6 is based on the floor plan illustrated in exhibit 8. These designs are accessible to the public for replication at other locations through the website. The team modified the designs to incorporate new code requirements and other affordable and technically relevant features.

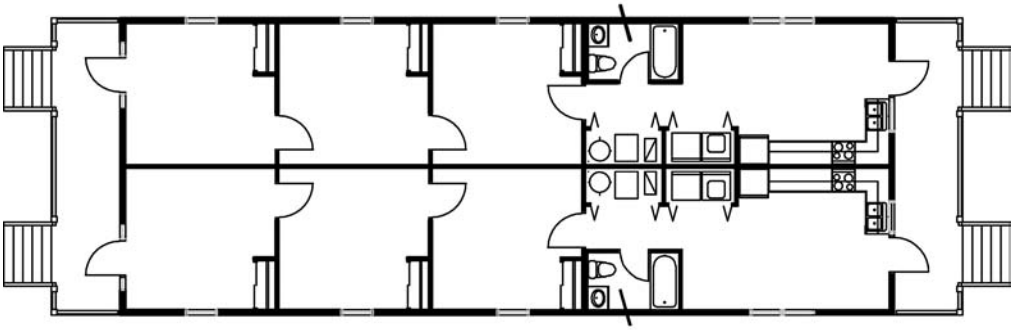
Exhibit 5

Hurricane-Damaged Duplex in Orleans Parish, Louisiana

A duplex unit in the Tremé/Lafitte neighborhoods in Orleans Parish selected for reconstruction. Photo credit: James Goedert.

Exhibit 6

Modified Floor Plan of Duplex Unit



Construction Strategy

A pre-Hurricane Katrina analysis of the housing market in Orleans Parish indicated that nearly 70 percent of occupied housing units were one- and two-person households (U.S. Census Bureau, 2006). The remaining 30 percent of housing units comprised three- and four-person households

(about 15 percent each). These ratios were similar after Hurricane Katrina, but the number of occupied housing units decreased from approximately 180,000 to 74,000. Approximately 47 percent of the pre-Hurricane Katrina housing units were owner occupied; the remaining units were renter occupied. The cost range for the new houses was from just under $100,000 to $170,000. About 43 percent of the households earned less than $50,000 a year and almost one-half of those earned less than $25,000 per year. Even at a three-times multiplier, affordable housing was going to be difficult to accomplish.

The team needed to research affordable designs that resist the harsh environmental conditions in New Orleans and that consider life-cycle energy costs, structural durability, and cultural factors. Research of designs that blend in with the neighborhood started with *A Pattern Book for Gulf Coast Neighborhoods* by Urban Design Associates (2005). More valuable information was retrieved during numerous visits to see the neighborhoods. Even more important were the discussions with people living in the neighborhoods and the feedback received during the design charrettes.

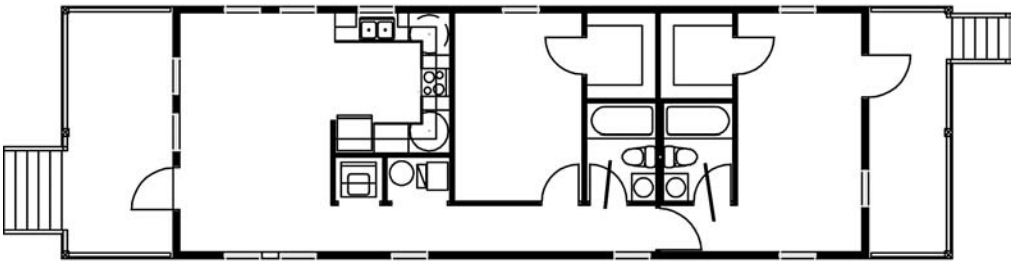
CCANO started with a list of nearly 200 adjudicated properties scattered throughout the Tremé/Lafitte neighborhoods. The project team evaluated the properties to determine whether rehabilitation, reconstruction, or new construction would be most appropriate. For the properties determined appropriate for new construction, the project team surveyed them for size and layout and then categorized them to determine house sizes that would best match the available properties. The project team then developed 13 designs and named them after trees indigenous to the area, including the 448-square-footr Yaupon that is 16 feet wide and 28 feet long and the 1,364-square-foot Willow Oak that is 22 feet wide and 62 feet long. It modified 11 of these designs, resulting in 24 single-family residents. It also designed 4 using 4 of the original 13 designs. Exhibit 7 is a rendering of the Drummond, and exhibit 8 is the floor plan. The project team made plans available through the website and through hardcopy distribution at design charrettes, neighborhood meetings, and offices at CCANO, Providence, and HUD.

Exhibit 7

Rendering of the 900-Square-Foot Drummond Model

Exhibit 8

Floor Plan of the 900-Square-Foot Drummond Model



Technical knowledge is available to help builders construct affordable housing that will resist damage due to hurricane force winds. In fact, a number of solutions are prescribed by the International Residential Code for One- and Two-Family Dwellings (International Code Council, 2006), which is the current code for the City of New Orleans. Code restrictions are minimum requirements and often do not include current or best available practices. Most houses damaged by the hurricane in the inner city were built long before these building codes existed. Many houses damaged by the rising flood waters were not built to the BFE. Some houses were designed to accommodate garages beneath them, but these garages were often converted into living spaces. These BFEs have recently been adjusted for all of New Orleans to form the basis for insurance rates.

Other techniques for resisting the harsh environmental conditions were found in publications such as the previously mentioned *Coastal Construction Manual* (FEMA, 2005). The Partnership for Advancing Technology in Housing (PATH), a program within the HUD Office of Policy Development and Research (PD&R), published *Durability by Design* (HUD PD&R PATH, 2002), which addresses a number of issues not specific to New Orleans but nonetheless relevant. This manual includes proper flashing techniques and decay and corrosion protection techniques among other topics. *Moisture-Resistant Homes* (HUD PD&R PATH, 2006), another PATH publication, includes a number of recommendations organized by systems.

Fernando Pages Ruiz is the owner of Brighton Homes and author of *Building an Affordable House: Trade Secrets to High-Value Low-Cost Construction* (Pages Ruiz, 2005). PATH sponsored the first concept house in Omaha, Nebraska, to disseminate information about the "efficient, sustainable, and flexible elements that make it the home of the future" (PATH, 2007). Brighton Homes constructed this home and Pages Ruiz worked as a consultant on the project, offering suggestions on a number of designs. The project team used his book and the HUD publications, as well as other valuable resources, in designing the affordable homes with the most currently available techniques while remaining sensitive to the needs of the neighborhood residents.

The project team reviewed a number of alternative house-building methods for the purposes of this project, including 2- by 4-inch wood framing, 2- by 6-inch wood framing, panelized wood framing, three concrete building methods, and structural insulated panels. The team learned quickly that the citizens of New Orleans like tradition, and that they needed to develop house designs that have the look and feel of New Orleans, with the affordable and advanced technical

features being less apparent. The first design charrette with homebuilders included discussions about modular, structural insulated panels (SIPs) and 2- by 6-inch framing. At this charrette, the project team focused on the exterior façade and floor plan and not on the method of construction because it could easily adapt the schematic designs to alternative methods. It developed the drawings using 2- by 6-inch construction at 24 inches on center instead of the more traditional framing, as explained in more detail in the next section.

Wood Frame Construction

Most wood-framed housing construction is 2- by 4-inch framing at 16 inches on center with two top plates and one bottom plate for exterior walls. In some cases, it is possible to use 24 inches on center with one top plate if the rafters, studs, and joist line up, maintaining the load path. This method eliminates one stud every 4 feet and one plate all around the perimeter, thus reducing the cost of the building. In addition, because wood is not as good of an insulator as fiberglass, and because the construction method uses less wood and more insulation, the energy efficiency of the house is improved for the life of the house. The design wind load in New Orleans, which is 130 miles per hour, requires that 2- by 4-inch construction be 16 inches on center, which is typical wood frame construction. An alternative is 2- by 6-inch wood frame construction at 24 inches on center, which is not only stronger but increases the depth of the insulation by 50 percent. The labor cost of framing and installing insulation is the same for both methods while the material cost is greater for 2- by 6-inch wood frame construction. The 2- by 4-inch method uses three studs for every 4 feet of exterior wall, but the 2- by 6-inch method uses only two. The cost of a 2- by 6-inch method, however, can be nearly twice that of a 2- by 4-inch method, causing a 30-percent increase in cost of this single lumber component. Doebber and Ellis (2005) showed that 2- by 6-inch framing resulted in 33.3 percent annual furnace energy savings over conventional framing when analyzed for homes built in Miami and 24.3 percent for homes in Phoenix. The central air conditioning cost savings were more modest at 0.7 percent for Miami and 1.0 percent for Phoenix. The initial cost of the additional insulation is slightly higher but could result in a smaller, less expensive furnace and air conditioning unit. The 2- by 6-inch wood frame construction results in a reduced total life-cycle cost because of the reduced energy cost.

The concept house that the Operation Helping Hands built in New Orleans used panelized construction, a wood-framing method in which panels are created in a factory, shipped to the job site, and erected using a small crane and crew. This method is extremely fast on the job site, requiring fewer skilled crafts than traditional framing. By using this method of framing, the team framed the concept house in a few days rather than a few weeks. This approach is particularly important for New Orleans with its limited skilled labor pool. In addition, the quality of construction should be improved because of the factory environment in which the panels are produced.

Concrete Homes

Residential concrete homes are gaining in popularity and market share. Several types of concrete homes and several manufacturers of each type are available. Concrete homes are durable and resist fire, wind, mold, and insects. In addition, the energy savings, as well as the cost savings, are significant when compared to wood-framing methods. Additional energy-related benefits include increased thermal capacitance and reduced air infiltration. The reduced air infiltration can become

a problem, and mechanical ventilation may be necessary to ensure a healthy living environment. Residential concrete construction includes insulated concrete forms, sandwich panels, and precast panels.

Insulated concrete forms are permanent, double-wythe forms made from lightweight expanded polystyrene that are filled with reinforced steel and concrete. This technology was used on 3 percent of homes in 2005 according to the National Association of Home Builders (Doebber and Ellis, 2005). The panels are lightweight and easy to install and are left in place. They can be used for the basement, as in the PATH concept house, or they can be used for both the basement and above-ground walls. The basement of the PATH house took approximately 6 hours to complete, and this includes setting the forms and placing the concrete. No form removal is needed, and the waterproofing and interior framing are included. Doebber and Ellis (2005) found that insulated concrete forms saved 77.7 percent in furnace energy and 2.4 percent in central air conditioning in Miami and 44.8 and 7.4 percent, respectively, in Phoenix, when compared to conventional framing. The Canadian National Building Code recently adapted its code to include insulated concrete forms for basement and above-ground installation by providing prescriptive engineering requirements (Storer, 2007).

Several variations of concrete sandwich panels include polystyrene insulation. Holmes, Kusolthamarat, and Tadros (2005) describe a precast sandwich panel duplex with 2.5 inches of concrete on both sides of a 5-inch expanded polystyrene panel. Fiberglass connectors connect the concrete wythes together to maintain the thermal integrity of the assembly. The exterior concrete finish includes some architectural finishes and some 0.5-inch brick facing requiring little or no maintenance. Doebber and Ellis (2005) analyzed a panel with 2 inches of concrete on the outside and 4 inches on the inside of 3 inches of polystyrene insulation. They found that this configuration produced furnace energy savings of 84.5 percent and 32.5 percent for Miami and Phoenix, respectively, and central air conditioning savings of 2.4 percent and 5.7 percent, respectively.

Residential precast concrete panel construction is much more prevalent overseas than in the United States and dates back a number of years. Widespread usage occurred in the Soviet Union, Western Europe, and the United Kingdom 35 years ago (Selbe, 1973). The advantage overseas was mostly related to the availability of raw materials. Energy savings are much more important now, and the insulated concrete forms and sandwich panels are better concrete alternatives when compared to precast panels. Thin-wall precast systems from 1.5 to 3.0 inches thick are also available and can include an architectural finish. These panels are usually reinforced with a stud system. The stud system also "resists lateral loads, carries vertical loads, and can serve as a frame for the attachment of interior finishing materials" (Miller, 2006: 56).

Structural Insulated Panels

Structural insulated panels are sandwiched panels with foam insulation inside two layers of oriented strand board, plywood, or fiber cement. These panels are laminated together into a panel that is easily assembled at the site with little training. The advantages of structural insulated panels over conventional construction are strength and energy efficiency. The International Code Council adopted the panels into the International Residential Code in May 2007. A 4-inch thick SIP wall would have an *R* value of 15 as compared with 11 for a 4-inch wood frame wall. The continuous insulation reduces thermal bridging and air infiltration. As with the concrete and alternative fram-

ing method, the initial cost of this method is higher, and cost savings must be realized through future energy savings.

The new house designs this project provided are easily adaptable to any of the shells previously mentioned. The *Engineering News-Record* featured three concrete home companies with different products saying, "their products can be custom-made to fit any architectural style, which is important in New Orleans' and Mississippi's historic neighborhoods" (Bergeron, 2006: 16). PAR Contractors, Inc., of New Orleans, indicated at the first design charrette that the company could use the schematic drawings to create the SIP to build their houses. Millard Lumber, Inc., from Omaha, Nebraska, creates its own drawings from those provided by an owner or builder to send to the automated shop for panelization. The 24 house designs and 4 duplex designs this project provided can be built with any of the previously mentioned methods. The same is true of the designs described in the previous discussion regarding reconstruction.

Conclusion

New Orleans is slowly rebuilding but may never fully recover from the social and economic impacts of Hurricane Katrina. Finger pointing is moot in a major catastrophe. The fact is that many poor people lived in the low-lying areas of the city and were hurt the most. Rebuilding the same house in the same location and with the potential for future flooding was not practical. In a number of areas, building to meet current codes made little sense without a new urban plan because of the small lot sizes and numerous other social and engineering problems. Most solutions, while sensitive to the plight of the poor, were inadequate to respond to their needs on the scale necessary to reestablish the pre-Hurricane Katrina livelihood.

A number of expensive features can be included in a design to mitigate or eliminate damage caused by wind, rain, and flooding. It became quickly apparent that revolutionary construction models were not going to get the people of New Orleans what they needed most, which was to get back into their homes. This research was focused on affordable solutions that could be easily incorporated into the new and existing construction.

Of the project's three strategies—rehabilitation, reconstruction, and construction—the rehabilitation strategy was achieved. This project affected an entire neighborhood by rehabilitating 9 duplexes, for a total of 18 units, all in a one-block area. Also, during the demolition and cleanup of more than 2,000 units, the project team used the protocol manual that Catholic Charities of the Archdiocese of New Orleans, through Operation Helping Hands, developed. The team also made the manual available via a website to builders, officials, and homeowners.

The reconstruction strategy seemed to have the greatest potential to help 10 homeowners replicate their house design, but it did not meet this objective. It quickly became apparent that if rehabilitation was not an option, then it would be extremely difficult to get the code variances necessary to reconstruct using the same footprint. Nine design plans for houses damaged beyond repair were created and made available to the public. One single-family unit and one duplex were actually rebuilt as a result of this effort.

The construction strategy objective was exceeded in terms of the available design, but actual construction is lagging. The goal was to design 10 sets of new house designs and 10 variations of those designs that blend with the neighborhood. The project created a house design manual that displays 13 new house designs, 15 variations, and four duplexes. The manual can be distributed to residents. The designs match the neighborhoods, are affordable, and are able to resist the harsh environmental conditions. The complete construction drawings are available for downloading in .dwg or .pdf format at http://www.const.unomaha.edu/neworleans/index.php. CCANO encountered a number of complications with the adjudicated properties and the organization is nearly 18 months behind the original goal to begin construction. No one is more frustrated than CCANO at the inability to clear title on more than 200 lots to begin the process of new construction in the Tremé/Lafitte neighborhoods. It took almost 3 years after Hurricane Katrina occurred for any new house construction to begin. Operation Helping Hands is shifting the focus from demolition and rehabilitation to new construction and is using the drawings from this project to distribute to the community.

The rebuilding effort has been discouragingly slow. The rehabilitation effort is well under way, but few new homes have been constructed in the inner city. A number of unresolved issues, as well as the introduction of new codes and standards, have made it extremely difficult to make the progress needed for the residents to return to the life they once knew. The project was an extraordinary opportunity for student involvement with a social issue that included construction engineering and management problems. The challenge was to match student skills in a manner that provided good-quality documents for the user. These documents can be extended to other coastal areas in need of affordable designs and are available to the public. The Construction Engineering and Management programs at the University of Nebraska–Lincoln currently use community service projects as a service-learning component in the curriculum. Senior construction students supervise the renovation of houses in partnership with local nonprofit organizations. A reasonable extension of this project and the service-learning component could include a national effort to mobilize the tens of thousands of construction students in the United States to provide supervision for national disaster reconstruction.

Acknowledgments

The project described in this article was funded through the U.S. Department of Housing and Urban Development (HUD), Office of Policy Development and Research's University Rebuilding America Program. The author acknowledges the support of HUD staff in New Orleans and at HUD headquarters in Washington, D.C. He also acknowledges Catholic Charities of the Archdiocese of New Orleans and its affiliates and employees, especially Charlotte Bourgeois and Deacon John Ferguson. He also acknowledges the hard work of the University of Nebraska–Lincoln faculty members in the Construction Engineering and Management programs, including Stuart Bernstein, Yong Cho, George Morcous, and Avery Schwer. Finally, the author extends special thanks to faculty member William Holmes for his tireless work with students in developing the new house designs.

Author

James Goedert is an associate professor at the University of Nebraska–Lincoln, College of Engineering, and is the chairman of the Construction Engineering and Management programs in the Charles W. Durham School of Architectural Engineering and Construction.

References

Angelo, William J., and Angelle Bergeron. 2007. "Starting Slow, New Orleans Rebuilding is Gathering Up Support," *Engineering News-Record*, February 5.

Bergeron, Angelle. 2006. "Reconstruction: Concrete Homes Address New Orleans Housing Crisis," *Engineering News-Record*, September 11.

Cochran, John. 2005. "Searching for the Right Blueprint," *CQ Weekly* (September 12): 2370.

Doebber, Ian, and William E. Ellis. 2005. "Thermal Performance Benefits of Precast Concrete Panel and Integrated Concrete Form Technologies for Residential Construction," *ASHRAE Transactions* 3: 340–352.

Federal Emergency Management Agency (FEMA). 2007. Flood maps from June 29, 2006. https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp (accessed October 29, 2007).

———. 2006. Hurricane Katrina Surge Inundation and Advisory Base Flood Elevation Map, Orleans Parish, Louisiana. https://www.fema.gov/pdf/hazard/flood/recoverydata/katrina/maps/katrina_la_or-gg39.pdf (accessed November 3, 2007).

———. 2005. *Coastal Construction Manual.* FEMA 55, Ed. 3. Washington, DC: Federal Emergency Management Agency.

Holmes, William W., David Kusolthamarat, and Maher K. Tadros. 2005. "NU Precast Concrete House Provides Spacious and Energy Efficient Solutions for Residential Construction," *PCI Journal* 50 (3): 16–25.

International Code Council. 2006. International Residential Code for One- and Two-Family Dwellings. Washington, DC: International Code Council, Inc.

Matthew Bender and Company. 2007. New Orleans Comprehensive Zoning Ordinance. http://www.ordlink.com/codes/neworleans/ (accessed October 20, 2007).

Miller, Brian. 2006. "Precast Loses Weight, Gains Value," *MC Magazine* (May/June): 56–59.

Pages Ruiz, Fernando. 2005. *Building an Affordable House: Trade Secrets to High-Value Low-Cost Construction.* Newton, CT: The Tauton Press.

Partnership for Advancing Technology in Homes (PATH). 2007. PATH Concept Home website. http://www.pathnet.org/sp.asp?id=1175 (accessed November 10, 2007).

Providence Community Housing. 2007. Providence Community Housing website. http://www.providencecommunityhousing.org/index.html (accessed September 27, 2007).

Selbe, Rexford L. 1973. "Precast Concrete in Residential Construction," *Journal of the Urban Planning and Development Division* 99: 93–96.

Storer, Larry (ed.). 2007. "Canadian National ICF Building Code Moves to Forefront," *Concrete Monthly* (February): 11.

University of Nebraska. 2007. Universities Rebuilding America Partnership—New Orleans Project. http://www.const.unomaha.edu/neworleans/index.php.

Urban Design Associates. 2005. *A Pattern Book for Gulf Coast Neighborhoods*. Pittsburgh, PA: Urban Design Associates.

U.S. Census Bureau. 2006. Population Estimates. http://factfinder.census.gov/servlet/DTTable?_bm=y&-geo_id=05000US22071&-ds_name=PEP_2006_EST&-mt_name=PEP_2006_EST_G2006_T001__ (accessed October 30, 2007).

———. 2000. Census 2000 Demographic Profile Highlights. http://factfinder.census.gov/servlet/SAFFFacts?_event=&geo_id=05000US22071&_geoContext=01000US%7C04000US22%7C05000US22071&_street=&_county=orleans+parish&_cityTown=orleans+parish&_state=04000US22&_zip=&_lang=en&_sse=on&ActiveGeoDiv=&_useEV=&pctxt=fph&pgsl=050&_submenuId=factsheet_1&ds_name=ACS_2006_SAFF&_ci_nbr=null&qr_name=null&reg=&_keyword=&_industry= (accessed October 30, 2007).

U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Partnership for Advancing Technology in Housing (HUD PD&R PATH). 2006. *Moisture Resistant Homes—A Best Practice Guide and Plan Review Tool for Builders and Designers*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

———. 2002. *Durability by Design—A Guide for Residential Builders and Designers*. Washington, DC: U.S. Department of Housing and Urban Development, Office of Policy Development and Research.

U.S. Green Building Council (USGBC). 2005. *The New Orleans Principles*. U.S. Green Building Council, New Orleans Planning Charrette, November 9–11, 2005.

Vehicle Carbon Dioxide Emissions and the Compactness of Residential Development

Paul Emrath
Fei Liu
National Association of Home Builders

Abstract

Vehicle carbon dioxide (CO_2) emissions have concerned many policymakers and researchers. Although the existing literature indicates that vehicle miles traveled (VMT) have been studied extensively, little research has examined household gasoline consumption directly. This study analyzes the effects of geographic, household characteristics and compactness of subdivisions on gasoline consumption, which can be converted to CO_2 emissions directly. The data used come from the 2001 National Household Travel Survey. The results show that VMT declines as the compactness of subdivisions increases, but vehicles tend to be driven at less efficient speeds in more compact subdivision. The reduced efficiency in driving speed is not strong enough to totally offset the reduced VMT, however, so that gasoline consumption and the associated CO_2 emissions still tend to be lower in more compact developments.

Introduction

Vehicle use and carbon dioxide (CO_2) emissions have attracted substantial attention in recent years. According to the Energy Information Administration (EIA), CO_2 has the largest effect on global warming of any monitored greenhouse gas.[1] About 33 percent of total U.S. greenhouse gas emissions are generated from the transportation sector, and, among these, CO_2 emissions represent 95 percent of the greenhouse gas emissions from mobile transportation sources (EPA, 2007).

[1] Other greenhouse gases include methane, nitrous oxide, various hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Concerns about these numbers and their possible implications for climate change issues have prompted states such as California, Massachusetts, and Washington to require that developers quantify greenhouse gas emissions from vehicle use in large residential projects they are planning. California and Massachusetts currently do not provide any guidance on how to perform the calculations. King County in Washington actually provides a spreadsheet that enables developers to estimate greenhouse gas emissions for various types of development, with calculations based largely on national averages that use relatively little information about the nature of homes being built other than basic structure type (see http://www.metrokc.gov/permits/info/site/ClimateChange.aspx). Although the spreadsheet is useful in the sense that it enables developers to estimate emissions (as required by local ordinance) and, therefore, provides a mechanism that allows development to be approved, it provides little guidance on how a particular development may be better planned and executed to help reduce emissions. A need remains for statistical models that are able to estimate variables such as vehicle miles traveled (VMT) and CO_2 emissions from vehicle use at the level of a typical development and to show how they are related to characteristics of the development.

This article estimates household gasoline consumption and associated CO_2 emissions using data from the 2001 National Household Travel Survey (NHTS) and least square regressions to estimate gasoline consumption as a function of the geographic and household characteristics available in the NHTS data. Housing units per acre is used as a proxy for the compactness of a residential subdivision, and the estimates show how vehicle use, CO_2 emissions, and other related household travel variables respond to changes in subdivision compactness.

Following this introductory section, the second section of this article reviews the relevant literature. The third section addresses the NHTS data set. The fourth section explains how the equations to be estimated were constructed, and the fifth section presents and discusses the results. A separate section is devoted to subdivision compactness, because it is an explanatory variable of special interest; this section includes a discussion of why subdivision compactness may be related to travel behavior and how to interpret the results in light of complications such as self-selection. The final section offers a conclusion of the findings.

Literature Review

The relationship between built environment and travel has been heavily researched in the past two decades. More than 60 studies are covered in a survey article by Ewing and Cervero (2001). The features of the built environment analyzed in these studies is quite varied, but the dependent variables studied are usually trip frequencies, trip lengths, mode of transportation, person miles traveled, and either vehicle hours traveled (VHT) or VMT.

Cervero and Radisch (1996) modeled the number of trips per person and the probabilities of using a mode of transportation other than automobile, using a sample from the San Francisco Bay Area. They controlled for different neighborhood designs including traditional, mixed-use neighborhoods, and newer neighborhoods with separated land uses and curvilinear streets. Their results show that nonwork trip frequencies are similar for the two Bay Area communities studied and that transportation modes other than automobile are more likely to be used for nonwork trips in a traditional neighborhood.

Holtzclaw (1994) studied the impact of community density measures on average VMT per household and found that VMT is lower at higher household densities. The data set Holtzclaw used is also a regional sample from the San Francisco Bay Area. Ewing (1995) examined the impact of gross residential/employment density of traffic zones on VHT per household, using a data set from Palm Beach County, Florida. Frank, Stone, and Bachman (2000) studied both VMT and VHT per household, while controlling for household density and employment density. They found that in the Seattle area, VMT and VHT are lower in areas of high household density and employment density.

Recently, Glaeser and Kahn (2008) studied the CO_2 emissions from cars and air conditioners in large metropolitan areas. They found that low-density development, particularly in the South, is associated with far more CO_2 emissions than is higher density construction.

An issue that arises in such studies is whether estimated relationships between travel and built-environment variables are due to a selection effect—for example, individuals who prefer to drive less select pedestrian- or transit-friendly environments—or are due to an environment effect—for example, pedestrian- or transit-friendly environments cause individuals to drive less.

Handy (2005) reviewed the empirical evidence regarding the relationship between the built environment and physical activity behaviors. She pointed out that the available evidence on the question of self-selection is limited. A few papers tried to explore the possibility of self-selection, including Greenwald and Boarnet (2001), who used neighborhood characteristics as instrumental variables to control for self-selection; in addition, Bagley and Mokhtarian (2002) provided a more sophisticated analysis using a structural equations modeling approach. Other papers tried to control for self-selection using other methods, such as a quasi-experimental design by Handy and Mokhtarian (2005); to tease out selection effects they compared residents who had recently moved into eight neighborhoods in northern California with residents of the same neighborhoods who had lived there for more than 1 year. Cao, Mokhtarian, and Handy (2006) reviewed more than two dozen studies that attempted to control for self-selection in some fashion and reported that virtually every one of these studies still found that some aspect of the built environment had a statistically significant influence on travel behavior.

The NHTS Data

Much of the research on travel behavior uses specialized data sets from specific local areas. The conclusions drawn from these studies may be quite useful but are often difficult to generalize to the national level. When a national data set is employed to analyze household behavior, it is often from the NHTS (see http://nhts.ornl.gov/), which the Federal Highway Administration (FHWA) in the U.S. Department of Transportation conducts at somewhat irregular intervals. The stated purpose of the NHTS is to provide information to assist transportation planners and policymakers who need comprehensive data on travel and transportation patterns in the United States. The NHTS is designed to capture all trips undertaken by all household members in all households; it is not limited to work travel behavior.

Data for the most recent survey (officially titled the 2001 NHTS) were collected through computer-assisted telephone interviews between March 2001 and May 2002. The survey was based on

list-assisted random digit dialing design, employing a systematic sampling technique to generate a representative sample of all U.S. households with telephones. The 2001 national NHTS design was based on a sampling rate of roughly 1 in every 4,000 U.S. households. The response rate was approximately 80 percent.

In principle, the NHTS can be used to analyze any of the travel behavior variables described in the survey article by Ewing and Cervero (2001). Of these variables, VMT is likely to have the strongest correlation with gasoline consumption and CO_2 emissions, although gasoline consumption will also depend on the type of vehicles owned and how they are driven.

In this regard it is interesting to note that the NHTS data set also includes an explicit estimate of gasoline consumed per household. Because greenhouse gas emissions and climate change are issues of increasing public interest, and because CO_2 emissions can be computed directly from gasoline consumption using a simple conversion factor available from the EIA, it is perhaps peculiar that the NHTS gasoline consumption variable has not been used more often.

The primary purpose of this study is to analyze the effects of compactness of development and other possible explanatory factors on gasoline consumption and CO_2 emissions. To facilitate comparison with other studies, however, and to show how CO_2 emissions are related to other aspects of vehicle use, this study also analyzes VMT, the efficiency of the vehicles owned, and the efficiency of the speed with which vehicles are driven.

To conduct the analysis, it is necessary to derive some vehicle use variables from the raw numbers in the NHTS microdata set. For households that own more than one vehicle, the average efficiency of the vehicles owned (in miles per gallon) is derived as a weighted average for each vehicle in the household, with the weights determined by VMT for each vehicle. Average speed driven is calculated as the household's total miles driven on all trips in a recorded travel day divided by total hours spent on these trips.[2] The inefficiency of the speed with which the vehicles are driven is computed as the difference between the average speed household vehicles are driven and the theoretical optimal speed of 45 miles per hour.[3]

Data on the built environment in the 2001 NHTS may seem limited compared to a wish list of variables land use planners would like to investigate, but a number of useful geographic variables are available. The NHTS data do not identify individual states but indicate the four principal Census regions. The data set also indicates whether a household is in a metropolitan statistical area

[2] The NHTS contains several data files, including household, person, vehicle, and travel day trips files. We merged all other data files to household files to obtain needed information. For example, VMT and gasoline consumption are from the vehicle file, and total miles driven and total hours spent on these trips are from the travel day trips file.

[3] The FHWA's measure of vehicle efficiency adjusts for many factors, such as average miles driven per day, seasonal temperature variations, humidity, and road surface conditions. FHWA uses average miles driven per day to categorize most of the driving done as "highway" or "city." Highway driving is assumed to be characterized by less frequent stops, long trip length, and, thus, greater efficiency; city driving is assumed to be characterized by more frequent stops, short trip length, and, thus, lower efficiency. The NHTS data do not contain enough information, however, to reproduce the FHWA's estimates of vehicle efficiency. Instead, we calculated the difference between average trip speed and a theoretical optimal speed. The optimal speed is considered to be about 45 miles per hour for motor vehicles with internal combustion engines, as reported in Ewing et al. (2007). Speeds above or below this "sweet spot" should result in lower efficiency and higher gasoline consumption.

(MSA) and provides some information about the MSA's population, although it does not identify individual metropolitan areas specifically. The NHTS data also indicate whether a home is located in an MSA with a rail transportation system, although they include no information about how close the transportation system comes to a particular home.

Perhaps of more interest, especially to residential land developers, is the fact that the NHTS data contain information about the block group (size in square miles and number of housing units) in which a particular household is located. Block groups are defined by the Census Bureau to capture approximately 500 housing units on average, roughly equivalent to the size of many residential subdivisions. Thus, density of development in a block group, measured in housing units per square mile, provides information at a scale that the actions of individual developers can influence—subject to restrictions imposed by local government approval and zoning decisions. For convenience, housing units per square mile is converted to housing units per acre and referred to as "subdivision compactness." The NHTS data do not show the compactness of the subdivision precisely, but group it into six categories—ranging from fewer than 0.08 units per acre, to more than 7.81 units per acre.[4]

When investigating effects of a subdivision attribute on travel behavior, it is important to control for household characteristics as much as possible. Household and housing unit characteristics available in the 2001 NHTS microdata file include gender, race, age, education level of the householder, household income, household size, whether the unit is single-family detached, and whether the unit is owner occupied. Income is measured by six categories, with the lowest income category to be the excluded category.[5]

The NHTS has one national sample and nine add-on samples that cover smaller geographic areas. We used the national sample in this study. The national sample contains two types of households: "100 percent households" and "usable households." A 100 percent household means 100 percent of household adults finished the survey; a usable household means more than 50 percent of the household adults finished the survey. We used the 100 percent households sample to avoid potential bias caused by the missing information in a household, which left us a sample size of 22,178.

Some key variables in this sample have missing values. Exhibit 1 shows the descriptive statistics and the number of nonmissing observations for each variable we used. In general, the number of missing observations is small but is highest for the travel-related measures that are used as dependent variables in the models. Thus, the size of the sample used in each model is restricted primarily by the number of nonmissing observations for the dependent variable. Since the number of missing values is relatively small, however, the bias resulting from item nonresponse should not be excessive. We used the weights that are provided in the data set for the purpose of inflating the national sample to the total number of 107 million households in the United States.

[4] The categories seem to break at odd places because in the data set the variable is expressed as housing units per square mile. We converted this to housing units per acre to generate a measure that is easier to visualize, but it results in categories that break at odd fractions of a housing unit.

[5] The six household income categories are the following: income under $20,000, income $20,000–$34,999, income $35,000–$49,999, income $50,000–$64,999, income $65,000–$79,999, income $80,000 and more. In the exhibits, these six categories are adjusted for inflation and are shown in 2007 dollars.

Exhibit 1

Descriptive Statistics

Variable	Percent/Average	Nonmissing Observations
Gallons of gasoline used	1,130	20,532
Vehicle miles traveled	23,926	20,850
Efficiency of vehicles owned (miles per gallon)	20.6	20,520
Inefficiency of speed driven*	18.8	19,100
Single-family detached home	67.7%	22,178
Owner-occupied home	70.2%	22,178
Number of persons in household	2.6	22,178
Number of workers in household	1.4	22,178
Male householder	40.5%	22,178
Black householder	9.6%	21,986
Hispanic householder	8.2%	21,986
Other minority householder	12.7%	21,986
Share of householders with at least a bachelor's degree	32.0%	22,098
Age of householder	48.6	22,178
Household income**		20,814
Below $23.5K	22.6%	
$23.5 to $41.1K	19.2%	
$41.1K to $58.8K	19.4%	
$58.8K to $76.4K	11.7%	
$76.4K to $94.0K	9.7%	
$94.0K and up	17.4%	
Block group density		22,178
Fewer than 0.08 unit per acre	14.4%	
0.08 to 0.39 unit per acre	13.9%	
0.39 to 1.56 units per acre	21.1%	
1.56 to 4.69 units per acre	31.0%	
4.69 to 7.81 units per acre	9.1%	
7.81 units or more per acre	10.5%	
Region		22,178
Northeast	19.1%	
Midwest	23.5%	
South	36.2%	
West	21.2%	
Metropolitan/urban characteristics		22,178
MSA with rail transport system	27.7%	
Urban, nonmetropolitan	8.8%	
Rural, nonmetropolitan	11.3%	
Rural, MSA population under 1 million	5.0%	
Urban, MSA population under 1 million	18.2%	
Rural, MSA population 1 to 3 million	2.4%	
Urban, MSA population 1 to 3 million	19.3%	
with density < 0.39 unit per acre	1.5%	
Rural, MSA population 3 million and up	1.9%	
Urban, MSA population 3 million and up	33.2%	
with density < 0.39 unit per acre	1.9%	

MSA = metropolitan statistical area.

**Measured as the difference from the theoretic optimal speed of 45 miles per hour.*

***Income categories are adjusted for inflation and shown in 2007 dollars.*

Source: 2001 National Household Travel Survey, Federal Highway Administration

On average, each household observed in the NHTS data set represents about 4,800 U.S. households. The average weight in the NHTS is about twice the value of the average weight in the American Housing Survey,[6] but it is much smaller than the average weights in other governmental surveys that collect detailed information on household behavior, such as the Consumer Expenditure Survey (about 17,000) and the Residential Energy Consumption Survey (about 22,000). The Bureau of Labor Statistics conducts the Consumer Expenditure Survey primarily to establish the weights in the Consumer Price Index. The EIA conducts the Residential Energy Consumption Survey to provide information on the use of energy in residential housing units in the United States. The only nationally representative survey that has drastically lower average weight than any of the surveys mentioned above is the American Community Survey, but it is not comparable because it does not collect very detailed information about household behavior.

Estimating Equations

The models estimated in this study are single equation regressions, where the dependent variable is one of the following: gasoline consumption, VMT, average efficiency of vehicles owned, and inefficiency of the speed at which the vehicles are driven. The explanatory variables include the household, housing unit characteristics, and geographic characteristics—including the measure of subdivision compactness—shown in exhibit 1. The general approach is to be inclusive and use all relevant information available in the NHTS to mitigate, to the extent possible, bias resulting from omitted variables.

To adjust for social and economic differences among households, the models employ a list of NHTS variables that has been established for this purpose—specifically, the NHTS-based set of travel forecasting models called the Transportation Analysis and Simulation System (TRANSIMS), which the Environmental Protection Agency and the U.S. Department of Energy have developed.[7] The TRANSIMS operates by generating "synthetic households" for a particular area, usually based on Census data, and then applying a simulation model to those households. The output of the simulation is travel behavior for households that have the characteristics of the synthetic households. This study employs simple regressions rather than a simulation model, but the data set used is the same as the one used to calibrate the TRANSIMS simulation—the NHTS—and the regression models employ all the NHTS household and housing unit characteristics that are used in the TRANSIMS.

In an attempt to make complete use of the geographic information available in the NHTS, we tried all the regional, metropolitan area, and urban-rural status variables as explanatory variables in the models in addition to the measure of subdivision compactness. The number of these variables is not large, and they are primarily categorical, so we tried many cross-product effects (for example, urban-rural status of the area crossed with the population size category of the MSA), and we

[6] In the 2006 American Housing Survey, 18,535 observations have weights equal to zero. The average weight is calculated with these observations excluded.

[7] For more information, see http://tmip.fhwa.dot.gov/transims/. For more information about creating synthetic households, see the paper by Beckman, Baggerly, and McKay (1995).

retained any that produced a regression coefficient of an economically significant magnitude in the final model.

In general, we did not use statistical significance as a criterion for retaining geographic variables in the models. None of the models, for instance, showed a statistically significant difference between the Midwest and the West census regions, yet the models retain a separate indicator variable for the Midwest region. Exhibit 1 shows descriptive statistics for all the variables used in any of the models.

Regression Results

Results of regressing household gasoline consumption, VMT, vehicle efficiency, and the inefficiency of the speed driven on the explanatory variables discussed previously, one equation at a time using ordinary least squares (OLS), are shown in exhibit 2.

The results show that household and housing unit characteristics all have effects on gasoline consumption that are statistically significant at the .01 level. In particular, the model estimates that gasoline consumption tends to be higher for households that are larger, contain more workers, have higher incomes, own their homes, live in single-family homes, are younger, are less well educated, and are headed by someone who is male, white, or Hispanic.

Some of these results (such as the finding that larger households use more gasoline) are quite intuitive. Others (such as some of the effects of race and ethnicity on gasoline consumption) are perhaps more surprising. It is important to remember that the model controls for all these factors (as well as the factors mentioned in other sections of the article) simultaneously. Thus, when the model finds that households with higher incomes tend to consume more gasoline over the course of a year, this finding is concluded after controlling for the size, incomes, race, and other factors of the household—as well as for characteristics of the area in which the home is located, to the extent those characteristics are available in the data.

The gasoline consumption model also finds that, all else being equal, gasoline consumption tends to be lowest for households in the Northeast region and highest for households in the South region. The strongest result the gasoline consumption model finds among the urban and metropolitan area variables is that households in urban areas consume less gasoline than households in rural areas, although, for the sake of completeness, the model analyzes all urban/metropolitan-size combinations available in the data. For example, the model estimates that a household in an urban area in an MSA with a population under 1 million consumes about 276 fewer gallons of gas than a household living in a rural area not in an MSA, all else being equal.

Nevertheless, the model estimates that a household would on average use about 70 fewer gallons of gas if it were in an MSA with access to rail transportation. Although we know that rail commuting is available in a limited number of metropolitan areas and that a minority of households uses rail transportation, the presence of rail transportation reduces gasoline consumption by about 70 gallons per household.

Most, but not all, of the geographic effects in the gasoline consumption model are significant at the .01 level, despite the fact that many of the explanatory variables are likely to be collinear. For

Exhibit 2

OLS Estimate (1 of 2)

Independent Variable	Dependent Variables							
	Gallons of Gasoline Used		Vehicle Miles Traveled		Efficiency of Vehicles Owned (mpg)		Inefficiency of Speed Driven**	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Intercept	694	39.3	14832	833	21.95	0.22	10.20 *	0.47
Single-family detached home	95.8 *	15.6	1645 *	331	– 0.66 *	0.09	0.02	0.19
Owner-occupied home	72.0 *	16.3	1297 *	346	– 0.66 *	0.09	– 0.60 *	0.19
Number of persons in household	93.5 *	5.28	1789 *	112	– 0.33 *	0.03	0.18 *	0.06
Number of workers in household	264 *	8.20	6384 *	175	0.51 *	0.05	– 1.02 *	0.10
Male householder	101 *	12.1	1633 *	258	– 0.18 *	0.07	– 0.54 *	0.14
Black householder	– 80.8 *	21.0	– 1201 *	444	0.34 *	0.12	1.28 *	0.25
Hispanic householder	26.4	34.6	315	731	– 0.38	0.19	1.33 *	0.41
Other minority householder	– 72.2 *	28.5	– 1072	605	0.66 *	0.16	0.13	0.34
Householder has at least a bachelor's degree	– 87.8 *	13.9	– 1294 *	296	0.96 *	0.08	– 0.03	0.16
Age of householder	– 2.84 *	0.45	– 61.0 *	9.52	– 0.03 *	0.00	0.12 *	0.01
Household income $23.5K to $41.1K	31.4	18.4	720	388	0.36 *	0.10	– 1.57 *	0.22
Household income $41.1K to $58.8K	168 *	18.9	3285 *	401	0.32 *	0.11	– 2.40 *	0.23
Household income $58.8K to $76.4K	278 *	22.5	5241 *	477	0.17	0.13	– 3.51 *	0.27
Household income $76.4K to $94.0K	315 *	24.5	5753 *	523	0.04	0.14	– 3.17 *	0.29
Household income $94.0K and up	464 *	22.3	8597 *	474	– 0.32 *	0.12	– 3.27 *	0.26
0.08 to 0.39 unit per acre	– 91.3 *	24.0	– 1600 *	510	0.76 *	0.13	1.63 *	0.28
0.39 to 1.56 units per acre	– 93.0 *	28.9	– 1886 *	614	0.63 *	0.16	2.29 *	0.34
1.56 to 4.69 units per acre	– 201 *	29.8	– 4248 *	635	0.57 *	0.17	4.34 *	0.35
4.69 to 7.81 units per acre	– 218 *	35.3	– 4623 *	749	0.65 *	0.20	6.09 *	0.42
7.81 units or more per acre	– 312 *	37.4	– 6574 *	795	0.47	0.21	7.81 *	0.45
Living in Northeast Region	– 83.9 *	19.5	– 1803 *	415	0.68 *	0.11	1.02 *	0.23
Living in Midwest Region	13.9	18.2	65.0	388	0.23	0.10	0.38	0.22
Living in South Region	70.2 *	16.8	1100 *	358	0.25 *	0.09	– 0.17	0.20
MSA with rail transport system	– 73.4 *	25.4	– 865	539	0.62 *	0.14	0.92 *	0.30

Exhibit 2

OLS Estimate (2 of 2)

Independent Variable	Dependent Variables							
	Gallons of Gasoline Used		Vehicle Miles Traveled		Efficiency of Vehicles Owned (mpg)		Inefficiency of Speed Driven**	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Rural, MSA population under 1 million	– 109 *	31.1	– 2589	662	– 0.07	0.17	0.37	0.37
Urban, MSA population under 1 million	– 276 *	30.2	– 5445 *	643	0.01	0.17	3.93 *	0.36
Rural, MSA population 1 to 3 million	25.8	41.4	– 129	878	0.04	0.23	0.26	0.49
Urban, MSA population 1 to 3 milion	– 272 *	32.8	– 5114 *	698	0.64 *	0.18	3.50 *	0.39
with density <0.39 unit per acre	77.8	54.6	1,733	1165	– 0.43	0.30	– 0.5	0.64
Rural, MSA population 3 million and up	65.6	49.2	384	1052	– 0.4	0.27	0.65	0.59
Urban, MSA population 3 million and up	– 190 *	37.1	– 3816 *	790	– 0.05	0.21	2.98 *	0.44
with density <0.39 unit per acre	86.7	49.8	510	1061	– 0.2	0.28	– 1.55 *	0.59
Urban, nonmetropolitan	– 171 *	30.3	– 3425 *	646	– 0.41	0.17	3.40 *	0.36
Number of observations used	20,356		20,673		20,353		18,948	
Adjusted R square	0.2705		0.2645		0.0742		0.1786	

mpg = miles per gallon. MSA = metropolitan statistical area. OLS = ordinary least square.

**Coefficient is significant at 1-percent level.*

***Measured as the difference from the theoretic optimal speed of 45 miles per hour.*

example, income is likely to be correlated with race and owner occupancy; subdivision density is likely to be correlated with urban-rural status. The effect of collinearity is to increase the standard errors on the coefficients of the relevant explanatory variables and reduce the statistical significance of the coefficients. In general, this collinearity does not seem to be a problem in the gasoline consumption model.[8]

We conducted a thorough sensitivity analysis on the gasoline consumption model to determine how the coefficients vary in the absence of some explanatory variables. The results are shown in the appendix, where columns (1) through (5) show the coefficients with some explanatory variables excluded. We find that the coefficients on household and housing unit characteristics are robust regardless of whether geographic and compactness variables are included. When the household and housing unit variables are excluded from the model, we find that the adjusted R-square drops significantly and the coefficient on intercept increases dramatically. This finding means that excluding such variables creates serious omitted variable bias, and thus it is crucial to include them in the model.

The compactness variables have negative effects on gasoline consumption in all sensitivity checks, and the magnitude increases while the compactness increases. When we exclude some explanatory variables from the model, however, the magnitude is, in general, bigger than the case when we include the full set of variables. This result implies that the omitted variables enlarge the effects of subdivision compactness. Therefore, the model we chose to estimate consists of all the relevant information and thus is least likely to have omitted variable bias.

By itself, the VMT model provides little insight on household travel behavior that is not evident in the gasoline consumption model. The statistical significance and relative size of the coefficients on the explanatory variables within each of the two regressions, in general, are similar.

Factors that increase gasoline consumption have a tendency to also increase the efficiency of the speeds at which the vehicles are driven. For example, additional workers in a household are associated with increased gasoline consumption but also with reductions in the inefficiency of the speeds at which the vehicles are driven. An urban location in a metropolitan area is associated with a relatively strong reduction in gasoline consumption but also with an increase in the inefficiency of driving speeds. It is possible to interpret this as a congestion effect (less efficient driving speeds).

The model for efficiency of vehicles owned has less explanatory power than the others shown in the exhibit, with an adjusted R-square under .1 and fewer coefficients on independent variables that are statistically significant. Nevertheless, some of the results are potentially interesting—for example, all else being equal, a household headed by someone who has at least a bachelor's degree tends to own vehicles that get about 1 more mile to the gallon than vehicles owned by households headed by someone who does not have at least a bachelor's degree.

[8] In addition, we tested the explanatory variables for multicollinearity using the Variance Inflation Factor. The test statistics show no significant evidence of multicollinearity in the model.

Subdivision Compactness

The explanatory factor that is the primary focus of this study is the block-group, housing-unit density or "subdivision compactness" variable. To illustrate the effect of this particular variable, exhibit 3 uses the regression results to estimate annual gasoline consumption and CO_2 emissions for a hypothetical subdivision with 100 households, assuming the average household and housing unit characteristics, under different assumptions about the subdivision's compactness. Gasoline consumption—the variable estimated in the model—is converted directly into CO_2 emissions by applying the factor obtained from the EIA, which is based on the number of carbon atoms in a gallon of gasoline and assumes complete combustion.[9]

The exhibit shows that the estimated gasoline consumption decreases as the subdivision becomes more compact, controlling for the household and geographic factors available in the NHTS data. For example, the estimated gasoline consumption is about 90,700 gallons for a subdivision of 100 households and a density of 1.56 to 4.69 units per acre. As the subdivision becomes more compact, the estimated gasoline consumption decreases to less than 80,000 gallons in the case where the density is more than 7.81 housing units per acre. Because CO_2 emissions are computed as a simple ratio of gasoline consumption, CO_2 emissions also decline in exhibit 3 as the subdivision becomes more compact, controlling for other factors.

This finding raises a question—why, since typical vehicle use undoubtedly involves many trips beyond the boundaries of an individual subdivision, would subdivision compactness matter? Several hypotheses are possible. One possible explanation is that homes located closer to each other foster social interactions among neighbors, leading to a tendency to occasionally visit neighbors rather than drive to a relatively remote location for entertainment. This explanation would be generally consistent with the findings of Glaeser and Sacerdote (2000) that individuals in large apartment

Exhibit 3

Estimated Annual CO_2 Emissions From Vehicles for 100 Housing Units

Compactness of Subdivision (housing units per acre)	Estimated Results				
	CO_2 Emissions (1,000 lbs.)	Gasoline Used (1,000 gals.)	Vehicle Miles Traveled (1,000 mi.)	Efficiency of Vehicles Owned (mpg)	Inefficiency of Speed Driven*
Fewer than 0.08	2,313.9	119.5	2,472	20.7	16.0
0.08 to 0.39	2,137.2	110.4	2,312	21.4	17.7
0.39 to 1.56	1,965.9	101.5	2,232	21.5	19.9
1.56 to 4.69	1,756.7	90.7	1,996	21.4	21.9
4.69 to 7.81	1,724.6	89.1	1,958	21.5	23.7
7.81 or more	1,542.9	79.7	1,763	21.3	25.4

mpg = miles per gallon.

**Measured as the difference from the theoretic optimal speed of 45 miles per hour.*

Notes: Estimates for an urban subdivision in a northeastern metropolitan area with a population of 3 million and up and a rail transport system. Distribution of household and housing unit characteristics as shown in exhibit 1.

[9] The conversion factor is 19.36 pounds of CO_2 per gallon of gasoline used. The EIA routinely uses the assumption of complete consumption to estimate CO_2 generated by burning fossil fuels (EIA, 2007).

buildings are more likely to socialize with their neighbors and to socialize in public spaces within the neighborhood. Large apartment buildings by their nature, of course, tend to be associated with compact subdivisions.

Another possible explanation is that, within a particular metropolitan area, development tends to be denser near employment or shopping centers, and the compactness variable would be acting as a proxy for the closeness to employment and shopping centers. Even in these cases, however, it would be plausible to argue that subdivision compactness may in some cases play a causal role—for example, if a somewhat densely settled residential area induces strip malls and shopping centers to be built nearby.

A similar chicken-or-egg argument could be made for public transportation. Dense residential development could be induced near a transportation node, or a transportation node could be deliberately placed so that it is near dense development. The data available in the NHTS do not enable us to distinguish between these or other alternative hypotheses, but they do allow us to demonstrate that a significant relationship between subdivision compactness and gasoline consumption persists after controlling for a substantial number of other factors.

The question of self-selection still remains. The models do not distinguish the case in which households first determine their travel behavior and then choose a compact subdivision that accommodates this behavior from the case in which households first choose a compact subdivision environment that subsequently influences their travel behavior.

We tend to agree with Ewing et al. (2007) who, in chapter 4, conclude that, from a public policy perspective, it may not always be important to distinguish self-selection from the case in which environment influences behavior. If the available supply of existing housing in a particular market area does not perfectly accommodate households with a strong preference for reduced gasoline consumption, providing new housing in subdivisions with the right characteristics can give these households someplace to go. In this way, more compact development may lead to reduced gasoline consumption either by directly causing a change in household behavior or by accommodating households with a preexisting desire to drive less.

By some standards, the relationship between subdivision compactness and vehicle CO_2 emissions reported in exhibit 3 may seem relatively modest. Subdivisions that qualify to be in the bottom row of the table are more than 95 times more compact than subdivisions in the top row, yet gasoline consumption and CO_2 emissions in the bottom row are only about one-third lower. On the other hand, many would consider a one-third reduction in CO_2 emissions to be a significant achievement.

To further help place the compactness numbers in context, we note that 1.56 to 4.69 housing units per acre translates into about 0.21 to 0.64 acre per unit, which is a fairly typical lot size for new construction. About 31 percent of single-family detached homes completed in 2006 were built on lots falling into this size range. Nearly 80 percent are on lots that are 0.64 acre or smaller (exhibit 4). Lot sizes, in general, will be smaller, however, than acres per housing unit measured over a block group or subdivision, because a subdivision will also typically include roads and other public spaces.

Exhibit 4

Land per Housing Unit

Housing Units per Acre Categories in NHTS Data	Converted to Acres per Housing Unit	Lot Sizes for New Single-Family Detached Units Completed in 2006 (%)
7.81 or more	Fewer than 0.13 acre	23.3
4.69 to 7.81	0.13 to 0.21 acre	24.9
1.56 to 4.69	0.21 to 0.64 acre	31.2
0.39 to 1.56	0.64 acre to 2.56 acres	14.1
Fewer than 0.39	2.56 acres or more	6.5

NHTS = National Household Travel Survey.

Source: U.S. Census Bureau, 2006 Survey of Construction

Exhibit 3 also shows estimated VMT and vehicle/driving efficiency measures. It reveals relatively little relationship between efficiency of vehicles owned and subdivision compactness, except that residents in the least dense subdivisions tend to own less efficient vehicles. It does show, however, a relationship between subdivision compactness and the average speeds at which vehicles are driven. As the subdivision becomes more compact, the estimated results show that vehicles are driven fewer miles, but they tend to be driven at less efficient speeds. This congestion effect is not strong enough to completely offset the effect of reduced VMT. So, on balance, households in more compact development still tend to use less gasoline and thus generate fewer CO_2 emissions from vehicles.

Conclusion

The NHTS is the primary data set produced by the federal government for the purpose of analyzing household travel behavior. This article has shown how that data can be used to estimate the efficiency of vehicles owned, how far they are driven, how efficiently they are driven, the amount of gasoline they consume, and the associated CO_2 emissions for a particular subdivision. In turn, these estimates can be used to show how, controlling for the demographic and other geographic variables in the NHTS, these household travel variables are related to the compactness of the subdivision, measured in housing units per acre.

In particular, the estimates show that gasoline consumption and the associated CO_2 emissions decline as the compactness of a subdivision increases. In addition, the estimates show that vehicles tend to be driven at less efficient speeds as the compactness of a subdivision increases. The lack of efficiency, however, is not strong enough to offset the reduced VMT, so that the predicted gasoline consumption and CO_2 emissions still tend to be lower in a more compact development.

The statistical relationship between compactness of development and reduced consumption of gasoline does not necessarily prove that a causal relationship between the two variables exists, but it does demonstrate that increased compactness and reduced gasoline consumption are complementary in the sense that they tend to occur together. Local jurisdictions with a policy objective of reduced CO_2 should take this finding into account and at least consider the possibility of allowing more housing units to be built per acre of land as part of an overall strategy.

Appendix

Sensitivity Analysis (OLS Estimates) (1 of 2)

Independent Variable	Dependent Variable: Gasoline Consumption									
	(1)		(2)		(3)		(4)		(5)	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Intercept	367	33.1	686	35.6	1467	25.74	1406	24.76	629*	38.6
Single-family detached home	145*	15.5	97.8*	15.6					113*	15.4
Owner-occupied home	146*	16.4	79.3*	16.3					86.4*	16.3
Number of persons in household	96.3*	5.37	91.5*	5.29					95.3*	5.29
Number of workers in household	264*	8.36	262*	8.22					263*	8.22
Male householder	100*	12.3	101*	12.1					98.5*	12.1
Black householder	– 130*	20.8	– 67.0*	20.6					– 91.6*	20.9
Hispanic householder	– 20.1	35.2	34.6	34.7					12.2	34.6
Other minority householder	– 107*	29.0	– 73.9*	28.5					– 74.4*	28.6
Householder has at least a bachelor's degree	– 131*	14.1	– 91.9*	13.9					– 92.8*	13.9
Age of householder	– 3.62*	0.46	– 3.04*	0.45					– 2.89*	0.45
Household income $23.5K to $41.1K	22.2	18.8	28.7	18.5					30.9	18.4
Household income $41.1K to $58.8K	152*	19.3	165*	19.0					170*	18.9
Household income $58.8K to $76.4K	247*	22.9	272*	22.5					280*	22.5
Household income $76.4K to $94.0K	262*	24.9	304*	24.5					319*	24.6
Household income $94.0K and up	401*	22.3	451*	22.1					472*	22.3
0.08 to 0.39 unit per acre			– 166*	21.7			– 84.4*	27.3		
0.39 to 1.56 units per acre			– 286*	20.0			– 140*	32.9		
1.56 to 4.69 units per acre			– 415*	18.9			– 299*	33.9		
4.69 to 7.81 units per acre			– 449*	25.8			– 407*	39.8		
7.81 units or more per acre			– 565*	27.6			– 578*	41.6		
Living in Northeast Region					– 92.4*	22.0	– 106*	22.0	– 79.4*	19.5
Living in Midwest Region					34.6	20.6	5.09	20.5	24.9	18.2
Living in South Region					46.6*	18.7	3.44	18.8	89.8*	16.7
MSA with rail transport system					– 53.0	28.8	– 9.30	28.8	– 88.0*	25.3

Appendix

Sensitivity Analysis (OLS Estimates) (2 of 2)

Independent Variable	Dependent Variable: Gasoline Consumption									
	(1)		(2)		(3)		(4)		(5)	
	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.	Coef.	St. Err.
Rural, MSA population under 1 million					– 72.0 *	35.3	– 51.9	35.4	– 128 *	30.8
Urban, MSA population under 1 million					– 420 *	25.2	– 227 *	34.4	– 391 *	22.2
Rural, MSA population 1 to 3 million					147 *	47.0	174 *	47.2	– 2.16	41.1
Urban, MSA population 1 to 3 milion					– 409 *	25.3	– 154 *	37.2	– 416 *	22.5
with density <0.39 unit per acre					306 *	55.9	95.2	62.3	167 *	48.9
Rural, MSA population 3 million and up					219 *	55.5	230 *	56.1	33.6	48.6
Urban, MSA population 3 million and up					– 329 *	32.2	– 66.6	42.1	– 340 *	28.4
with density <0.39 unit per acre					354 *	49.3	93.7	56.8	197 *	43.1
Urban, nonmetropolitan					– 295 *	30.1	– 175 *	34.6	– 247 *	26.3
Adjusted R square	0.2382		0.2635		0.0360		0.0496		0.2669	

MSA = metropolitan statistical area. OLS = ordinary least square.

**Coefficient is significant at 1-percent level.*

Acknowledgments

The authors thank Dave Crowe, Dave Ledford, Mark Shroder, and three anonymous referees for their helpful comments and suggestions on the earlier drafts of this article. All errors remain the authors' responsibility.

Authors

Paul Emrath is assistant staff vice president of Housing Policy Research in the Housing Policy Department, National Association of Home Builders.

Fei Liu is a housing policy economist in the Housing Policy Department, National Association of Home Builders.

References

Bagley, Michael N., and Patricia L. Mokhtarian. 2002. "The Impact of Residential Neighborhood Type on Travel Behavior: A Structural Equations Modeling Approach," *Annals of Regional Science* 36 (2): 279–297.

Beckman, Richard J., Keith A. Baggerly, and Michael D. McKay. 1995. "Creating Synthetic Baseline Populations," *Transportation Research A* 30A (64): 415–429.

Cao, Xinyu, Patricia L. Mokhtarian, and Susan Handy. 2006. *Examining the Impacts of Residential Self-Selection on Travel Behavior: Methodologies and Empirical Findings.* Research Report UCD-ITS-RR-06-18. Davis CA: University of California, Davis, Institute of Transportation Studies.

Cervero, Robert, and Carolyn Radisch. 1996. "Travel Choices in Pedestrian versus Automobile Oriented Neighborhoods," *Transportation Policy* 3: 127–141.

Energy Information Administration (EIA). 2007. Personal communication.

Ewing, Reid. 1995. "Beyond Density, Mode Choice, and Single-Purpose Trips," *Transportation Quarterly* 49: 15–24.

Ewing, Reid, and Robert Cervero. 2001. "Travel and the Built Environment," *Transportation Research Record* 1780: 87–114.

Ewing, Reid, et al. 2007. *Growing Cooler: Evidence on Urban Development and Climate Change.* Washington, DC: ULI–the Urban Land Institute.

Frank, Lawrence, Brian Stone, and William Bachman. 2000. "Linking Land Use With Household Vehicle Emissions in the Central Puget Sound: Methodological Framework and Findings," *Transportation Research Part D: Transport and Environment* 5 (3): 173–196.

Glaeser, Edward L., and Matthew Kahn. 2008. "The Greenness of Cities," *Rappaport Institute Policy Briefs*.

Glaeser, Edward L., and Bruce Sacerdote. 2000. "The Social Consequences of Housing," *Harvard Institute of Economic Research Discussion Paper Number 1915.*

Greenwald, Michael J., and Marlon G. Boarnet. 2001. "Built Environment as Determinant of Walking Behavior: Analyzing Nonwork Pedestrian Travel in Portland, Oregon," *Transportation Research Record: Journal of the Transportation Research Board* 1780: 33–42.

Handy, Susan. 2005. "Critical Assessment of the Literature on the Relationships Among Transportation, Land Use, and Physical Activity." Resource paper for *TRB Special Report 282: Does the Built Environment Influence Physical Activity? Examining the Evidence*. Transportation Research Board and Institute of Medicine Committee on Physical Activity, Health, Transportation, and Land Use.

Handy, Susan, and Patricia L. Mokhtarian. 2005. "Which Comes First? The Neighborhood or the Walking?" *Access* 26: 16–21.

Holtzclaw, John. 1994. "Using Residential Patterns and Transit to Decrease Auto Dependence and Costs." San Francisco: Natural Resources Defense Council: 16–23.

U.S. Environmental Protection Agency (EPA). 2007. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005*. Washington, DC: U.S. Environmental Protection Agency.

The Spatial Evolution of Casino Gambling

Michael Wenz
Winona State University

Abstract

This article examines the proliferation of gambling in United States counties during the 1990s and examines the factors that influence a region's decision to allow or prohibit casino gambling. Native American casino openings are driven by somewhat different factors than non-Native American casino openings. Both types of casinos are more likely to open in counties with large populations. More importantly, non-Native American casinos are more likely to locate near large populations across state borders. Strong regional variation in the probability of casino adoption exists, and the Mississippi River had a strong influence on the spatial evolution of gambling. As expected, Native American casinos are more likely to open in counties with large concentrations of Native Americans. Surprisingly, this study finds no evidence of strategic behavior among bordering counties and no evidence of competition between Native American and non-Native American casinos.

Introduction

On the list of socially acceptable pursuits, gambling ranks alongside such vices as smoking, drinking, and illegal drug use. Gambling is seen as addictive, and pathological gambling can cost people their homes, their jobs, their families, and even their lives. Yet over the past two decades, we have seen communities across the country open their arms to casino gambling in hopes that it would spur economic development. The study described in this article examines the factors that influence casino adoption and pays particular attention to the interrelationships among neighboring communities.

The casino location decision depends on the willingness of casino developers to supply gambling to the region and the willingness of local governments to enact laws that permit the casino to open. Developers are primarily interested in their ability to earn positive profits, while local governments may be influenced by the characteristics of their own region and those of neighboring jurisdictions. The model developed in the following paragraphs examines the importance of these characteristics as well as some other institutional factors that seem to have played a role in the growth of casino gambling.

The study uses two empirical strategies. First, a multinomial logit model examines the importance of various supply, demand, and institutional factors on the casino location decision and distinguishes how these influences have differed for Native American and non-Native American casinos. The most important factors in the casino location decision are the population of the host county and the proportion of Native Americans living in the county. A larger population increases the likelihood of a casino's opening in the region and an increase in the proportion of Native Americans increases the likelihood of a Native American casino but decreases the likelihood of a non-Native American casino. In addition, non-Native American casinos are attracted to locations near large numbers of people across state lines, but Native American casinos are not. The ability to attract tourists from outside the county is more important in predicting casino adoption than the characteristics of the host region itself. In addition, the riverboat casino and access to the Mississippi River played a large role in the early days of gambling expansion in the United States.

The second empirical strategy examines whether counties behave strategically. A number of researchers have considered the possibility that counties may turn to casino gambling as a way to protect themselves against cannibalization from nearby casinos in neighboring states, and that this strategy may lead to an equilibrium level of gambling that is too high (see, for example, Felsenstein and Freeman, 2001; Felsenstein, Littlepage, and Klacik, 1999; Grinols and Omorov, 1996). A discrete time hazards model is used to examine how the introduction of a casino in a bordering county affects the probability of a casino opening. This study finds no evidence that this sort of destructive competition is actually occurring. In addition, an examination of the data indicates that very little competition exists between Native American and non-Native American casinos. Local governments do not react to nearby casinos by expanding gambling in their own jurisdiction.

This article begins with a brief look at the history of casino gambling. The next section reviews the key issues in the academic and public debate over the expansion of casino gambling. The third section presents a set of hypotheses regarding potential influences on casino gambling. The fourth section discusses the empirical strategy and data. The fifth section presents results. The sixth section examines whether interstate competition has had an influence on casino adoption, and the final section concludes the study.

A Brief History of Casino Gambling

Although gambling has long been legal in 48 of the 50 states, mostly in the form of state-sponsored lotteries, casino-style gambling has largely been prohibited. In 1976, Atlantic City, New Jersey, joined the state of Nevada as the second jurisdiction in the United States with legalized casino-style gambling. In the 1970s, a handful of Native American tribes operated high-stakes bingo parlors, including the Penobscot Tribe of Maine, which opened a high-stakes bingo parlor in 1973, and the Seminoles of Florida, which opened a high-stakes bingo parlor in 1978. Questions about the legality of Indian gaming came to a head when the case of *California v. Cabazon and Morongo Bands of Mission Indians* went to the U.S. Supreme Court. The court ruled in 1987 that if states allow a particular form of gambling within the state, they have no ability to regulate that form of gambling on tribal lands.

In response to this decision, Congress passed the Indian Gaming Regulatory Act (IGRA) in 1988. The IGRA identifies three classes of gaming.[1]

> Class I: Social games for prizes of minimal value and traditional forms of Indian gaming engaged in as part of tribal ceremonies or celebrations. Subject to tribal regulation.
>
> Class II: Bingo and games similar to it, such as pull-tabs, tip jars, and certain nonbanking card games. Subject to oversight from the National Indian Gaming Commission.
>
> Class III: All other forms of gaming, including banking card games, slot machines, craps, parimutuel horseracing, dogracing, and lotteries. Subject to an agreed-upon compact between the tribe and the state.

Casino gambling is Class III gaming. A tribal-state compact can permit Class III gaming only in forms that are legal in some form in the state, although the courts have very loosely interpreted this provision. For instance, Connecticut allowed nonprofit organizations to host "Casino Nights" as fundraisers, and the Mashantucket Pequots successfully used these events as legal support to open Foxwoods Resorts Casino, which until recently was the largest casino in the world (Evans and Topoleski, 2002). Compacts outline the size, scope, and types of gaming allowed. Sometimes they include a payment to the state, often in exchange for some form of local monopoly rights.

Passage of the IGRA triggered rapid expansion of casino gambling throughout the United States, both on and off reservations. Iowa legalized riverboat gambling in 1989 and opened its first riverboat casino in 1991. In November 1989, the mining town of Deadwood, South Dakota, became the first jurisdiction outside of Atlantic City and Nevada to open a non-Native American casino. Riverboat casinos were legalized in Illinois, Mississippi, Louisiana, Missouri, and Indiana between 1990 and 1993, and New Orleans (1992) and Detroit (1996) authorized land-based casinos as well. Not including Nevada, by 2000, 358 Class III-style casinos operated in 28 states. Of these, 176 were Native American and 182 were non-Native American.

Exhibit 1 provides detail on the number of casinos and gaming positions in each state. Native American and non-Native American casinos average roughly the same number of gaming positions, with Native American casinos averaging 1,044 gaming positions, and non-Native American casinos averaging 1,024, although Native American casinos have more bingo seats and fewer slot machines. The largest casino in the United States, Foxwoods, a Native American casino located in Connecticut, has more than 10,000 gaming positions. At the other extreme are the card clubs scattered throughout California and the small casinos in the gaming towns of Deadwood, South Dakota, Cripple Creek, Colorado, Black Hawk, Colorado, and Central City, Colorado. In all, 65 casinos had fewer than 200 gaming positions in 2000, and 55 of those were in the gaming towns listed previously or were California card clubs. By 2000, 188 counties had at least one operating casino, either Native American or non-Native American.

The rate of growth in casino locations has slowed, but expansion continues to be an important political topic in many states, including Illinois, Minnesota, and Kentucky. Even as the growth in

[1] Industry publications, official statistics, and some other sources generally call casino gambling "gaming," which has a broader connotation, but this article makes no distinction between gaming and gambling.

the number of casinos has slowed down, the number of gaming stations at each location continues to increase, and, beginning with Delaware in 2000, casino-style gambling is expanding into racetracks. In addition, the rate of growth of consumer spending on casino gambling remains high, growing from $16 billion in 1995 to $24.5 billion in 2000 and $30.3 billion in 2005 (American Gaming Association, 2006).

Exhibit 1

Locations, Types, and Sizes of Casinos in the United States as of 2000 (excludes Nevada)

State	Number of Native American Casinos	Number of Non-Native American Casinos	Total Number of Bingo Seats	Total Number of Table Games[b]	Total Number of Slot Machines[c]	Total Square Footage
Arizona	19	0	6,280	259	7,838	871,799
California	32	14	16,200	1,830	18,231	2,270,988
Colorado	2	39	680	224	14,793	860,094
Connecticut	2	0	4,700	520	8,685	491,000
Delaware	0	3	0	0	5,435	78,700
Florida	3	1	2,150	66	2,900	207,500
Iowa	3	13	400	435	14,068	455,962
Idaho	3	0	0	69	1,747	90,000
Illinois	0	9	0	360	8,760	247,242
Indiana	0	9	0	668	14,743	460,060
Kansas	4	0	440	86	2,172	98,000
Louisiana	1	15	0	853	22,539	823,104
Michigan	16	3	2,878	656	20,366	977,337
Minnesota	16	0	5,390	407	16,448	1,094,681
Mississippi	1	30	2,500	1,449	43,366	1,791,469
Missouri[a]	0	10	0	581	15,200	527,101
Montana	4	0	680	0	291	39,000
Nebraska	1	0	300	4	116	20,000
New Jersey	0	12	1,000	1,211	33,757	1,120,789
New Mexico	11	1	2,250	204	7,579	417,500
New York	2	0	1,100	225	1,950	150,000
North Carolina	1	0	0	0	2,500	60,000
North Dakota	5	0	1,250	54	2,430	356,175
Oregon	7	0	2,645	149	3,993	478,000
South Dakota	8	23	800	121	4,462	389,166
Texas	2	0	1,030	62	1,100	100,000
Washington	18	0	5,550	549	5,290	554,660
Wisconsin	15	0	5,699	720	13,670	672,816
Total	176	182	63,922	11,762	294,429	15,703,143

[a] Maryland Heights and Players Casino opened adjacent to each other on March 11, 1997, and subsequently merged into one casino. They are treated as one casino in the data set.

[b] Exhibit games include roulette, blackjack, craps, and other card games not played on a machine.

[c] Slot machines include slot machines and video poker terminals.

Source: Gambling Answers (2003)

Modeling Casino Adoption

Very little empirical modeling of the determinants of casino locations has been performed, although the adoption of state lotteries has been examined somewhat. Berry and Berry (1990) use an event history analysis model to show that the adoption of state lotteries depends on the characteristics of the hosting state and the actions of neighboring states. Erekson et al. (1999) also model the determinants of state lottery adoption and find that the profit potential of the lottery and the fiscal health of the state are important determinants of lottery adoption. Neibergs (2007) suggests that state-level expansion of gambling, including lotteries and casinos, depends on fiscal health and some form of competition between states. This article is the first to empirically examine the casino location decision both across and within states.

Public arguments in favor of legalized casino gambling tend to focus on two main areas. The first is the promise of economic benefits to the area through job creation, new investment, increased levels of tourism, urban revitalization, and improvement of the status of the underprivileged or unemployed (Eadington, 1999). A primary difficulty in evaluating the economic benefits of casinos involves identifying the impact of casinos on other businesses and other regions. New jobs in the casino industry may come at the expense of existing jobs in movie theaters or restaurants, and tourist dollars spent in a casino are dollars that are not spent elsewhere. In looking at the whole economy, rather than just the regional one, local politicians are unlikely to consider the losses realized elsewhere. In areas where resources are involuntarily unemployed, however, casinos may in fact represent new economic activity. Eadington (1999) notes that locations that can become net exporters of gambling services by attracting consumers from outside the region are likely to benefit much more than locations that rely on local residents.

The second public justification for casino gambling is the additional source of revenue to the public sector. Marginal tax rates on gambling revenues range from zero for many Native American casinos to 50 percent for casinos in Illinois. The recent sale of a casino license in Illinois generated a bid of $563 million from Isle of Capri Corporation (*Chicago Sun-Times,* 2004). This evidence suggests the presence of significant above-normal profits accruing to local monopoly casino operators. The size of these profits is directly related to the amount of regulation regarding the number of locations; as more and more locations open casinos, excess returns will fall in all locations.

On the negative side, casinos have been associated with a number of negative externalities, such as pathological gambling, reduced worker productivity, higher bankruptcy rates, and increased illness and crime (see, for example, Grinols and Mustard, 2001). In addition, gambling is viewed by many as immoral. Computing the social costs of gambling is a particularly difficult task because many of the social costs are difficult or even impossible to measure (Walker, 2003; Wenz, 2007).

Absent from most of the public debate is the utility benefit provided to local gamblers, due primarily to the status of gambling as a vice and the significant public moral opposition to the expansion of gambling (Eadington, 1999). The utility benefit and the moral opposition are likely to influence the behavior of voters and, therefore, the casino location decision.

Predicting Casino Locations

The analysis in the following paragraphs begins by grouping casino location determinants into four broad categories: supply factors, intraregional demand factors, interregional factors, and institutional factors. In the empirical results section, regions are represented by counties. Supply factors refer to the characteristics that make a location desirable to casino operators. Intraregional demand factors refer to host county characteristics that influence the decision of a county to open a casino. Interregional demand factors refer to the characteristics of neighboring counties that influence casino policy in the host county. Finally, institutional factors, such as riverboat gambling, residents' voting behavior, and geographic size have had an influence on casino adoption.

Supply Factors

The supply of casinos to a location depends on the ability of casino owners to earn a profitable return on their investment. To earn a profit, they first and foremost need to have a sizable enough market to support casino gambling. Thus, casino locations are expected to be a positive function of the population of the host county and neighboring counties. In addition, residents' attitudes toward gambling may influence participation rates. Berry and Berry (1990) and Erekson et al. (1999) show that religious beliefs toward gambling influence lottery adoption. Based on the results of these earlier studies, casino locations are predicted to be negatively related to the concentration of fundamentalist Christians and positively related to the concentration of Catholics in the local area. Finally, the income of local residents may play a role in how much residents participate in gambling. The direction of the impact of differences in local incomes on the supply of gambling is not entirely apparent. If gambling is a normal good, increases in resident incomes should lead to more gambling; however, if gambling is an inferior good, casinos should want to supply their services in lower income areas. Empirical evidence on the income elasticity of gambling has primarily focused on demand for lottery tickets. The evidence is mixed and not particularly strong in either direction (Garrett and Coughlin, 2008; Mason, Shapiro, and Borg, 1989). In addition, higher incomes in the area mean higher wages for casino employees, driving up the wage cost of operating a casino in the area.

Intraregional Demand Factors

The demand for casino gambling in a location is reflected by whether the local jurisdiction allows the casino to enter. To a first approximation, the decision depends on whether the casino is viewed as a net benefit for the region. Grinols and Mustard (2001) construct a closed economy model for assessing the bottom line effect of casino gambling and identify a number of items that represent true benefits or costs to a region. At the forefront of their analysis is a recognition of the need to appropriately account for the displacement of other activities. Some potential benefits include increased resource utilization, business profits, and tax revenues. Potential costs focus primarily on externalities associated with the increased incidence of pathological gambling. A formal discussion of their model is presented in appendix A. This section focuses on the conditions under which a closed economy will be more likely to find that casino gambling provides net benefits.

First, casinos are expected to have a greater benefit and, thus, be more likely to locate in areas with high levels of underutilized resources, which are measured in the following discussion as

unemployment and housing vacancies. Bringing workers out of unemployment, for example, has a greater economic benefit than moving employed workers from their existing job into the casino industry. Evans and Topoleski (2002), who observe that Native Americans suffer from relatively high rates of unemployment, find that Native American casinos have led to reductions of Native American unemployment. In addition, because manufacturing employment has been declining in the United States (DOL BLS, 2006), the model considers whether counties with high concentrations of manufacturing employment may have turned to casinos to replace jobs lost from this sector.

Second, casinos may provide a benefit by increasing business profitability. To the extent that casinos crowd out movie theaters and restaurants, casino profitability represents a net benefit in a closed economy only if the casinos are more profitable than the businesses they replace. When a casino represents new business in the region, however, those profits provide a net benefit directly. One way to represent the existence of other activity is to measure the degree of urbanization. Casinos are expected to be more likely to locate in less urbanized areas. This argument carries to consumer surplus as well—if consumers enjoy gambling more than other available forms of consumption, the introduction of a casino will represent a net benefit to the area.

Finally, casinos may increase the ability of a jurisdiction to generate tax revenues. Berry and Berry (1990) argue that gambling may represent a politically palatable way to raise tax revenues, and tax rates on gambling tend to be higher than taxes on other businesses. Marginal tax rates are as high as 50 percent in Illinois, for instance. The potential for casinos to raise additional tax revenues suggests that casinos would be more likely to locate in areas having fiscal difficulties.

These potential benefits associated with casinos in a location must be weighed against the increase in negative externalities that they bring. Casinos will be permitted in areas where the expected benefits exceed the expected costs.

Interregional Demand Factors

The Grinols and Mustard (2001) model that forms the basis of the previous section is based on a closed economy, but from the perspective of a particular local jurisdiction, many of the costs and benefits travel across county and state lines. The interaction of different jurisdictions plays a critical role in the casino location decision. A central planner acting to maximize welfare in a closed economy can internalize many of the spillover effects associated with casino gambling, but a local planner in an open economy will not completely account for these effects. For example, a pathological gambler who travels to a casino in a distant location, runs up large debts, and returns home to rob his neighbor will enhance welfare in the casino region but reduce welfare in his home region. Although the Grinols and Mustard model makes no such distinction, the analysis in the following paragraphs accounts for it explicitly. A formal version of an open economy cost-benefit function for a region is presented in appendix A.

Local business profitability is likely to be affected in two important ways by interjurisdictional factors. First, an increase in tourism associated with casino gambling has the potential to increase local profits not at the expense of other local businesses but at the expense of businesses located in other areas. This tourism potential suggests that casinos will want to locate near large populations outside the jurisdiction. Native American casinos, which are typically but not always on reserva-

tions, will want to locate near large populations outside the reservation. Non-Native American casinos will want to locate in counties that are near other large counties. To the extent that state governments can act as a higher level of planner than local governments, however, the states will direct these casinos to counties that are near large populations across state lines. Native American casinos, however, should not have any preference for whether the residents come from the same or neighboring states. The prediction, then, is that non-Native American casinos should border large out-of-state populations, but Native American casinos should simply border large populations. The presence of negative externalities associated with pathological gambling leads to an identical prediction. Both Native American and non-Native American casino counties would like pathological gamblers to take their troubles home with them, and non-Native American casino counties would especially like that home to be in a different state.

In addition, business profitability will be enhanced in a region if casinos have a disproportionately high share of local ownership compared to the businesses they crowd out. A high concentration of local ownership is more likely to be the case for Native American casinos than for non-Native American casinos, which are generally owned by publicly traded corporations with widely dispersed shareholders.

Of high interest is reaching an understanding about whether neighboring jurisdictions behave strategically regarding casino adoption. The possibility of a prisoner's dilemma problem in the face of negative externalities and spillovers may lead to a situation in which cross-jurisdictional competition leads to an equilibrium level of gambling that is too high. Intuitively, one location may open a casino and export gambling to tourists from other regions. The casino region may find itself better off initially, but the tourists' home region may see a decline in welfare as tourists spend their consumption dollars outside the region and bring back some of the externalities associated with gambling. The tourists' home region, which may not have found casino gambling to be optimal initially, may now realize that it is faced with the negative externalities anyway and may turn to its own casino as an import substitution strategy. With a casino near home, the tourist now does not need to travel to gamble, and the region that opened the first casino may find itself in a less desirable position than had it never opened a casino. A number of studies have examined this possibility (Felsenstein, Littlepage, and Klacik, 1999; Grinols and Omorov, 1996). Felsenstein and Freeman (2001) go so far as to estimate the possible effects of cross-border competition in casino gambling between Egypt and Israel and find that this interjurisdictional competition can lead to the prisoner's dilemma outcome mentioned previously.

Left unexplored so far in the literature, however, is identifying whether this sort of destructive competition actually occurs. Neibergs (2007) conducts a state-level analysis of casino locations and finds some very weak evidence of competition but does not examine smaller jurisdictions. Shroder (1995) examines an analogous problem with the level of welfare benefits in different states and finds that, despite a theoretical potential for cross-border competition, no such competition occurs. If in fact communities are turning to casino gambling only in response to casinos in neighboring communities, the data should show that a nearby casino opening in a neighboring state should increase the probability of a casino in the home county. Finding this sort of interregional influence would suggest that cross-border competition leads to the overprovision of casino gambling. From a policy standpoint, finding cross-border competition would suggest a greater role for national-level

regulation of casino locations, but a failure to find this result would suggest no need for such oversight.

Institutional Factors

Aside from the supply and demand factors listed previously, some institutional factors may have played a role in the expansion of casino gambling. One quirk that helped shape expansion in the early 1990s was the phenomenon of riverboat gambling. Illinois and Iowa were two early adopters of legalized gambling, but these states restricted it to riverboats. The reason for this restriction is not particularly clear, although it may have something to do with zoning restrictions, a desire to make casinos seem less like a permanent part of the community, a nostalgic ploy used to market the idea to local voters, or a method to hold participant visits to a limited amount of time. Now, several riverboat casinos are still in existence, but few of them actually leave the dock. In any case, access to the Mississippi River or a coastal waterway suitable for a riverboat seems to have had a large influence on the early adoption of casino gambling. In addition, the voting behavior of local residents, the region of the country, and the geographic size of the county are considered as possible influences on the casino adoption decision.

Econometric Specification and Data

The previous discussion suggests a model of the following form:

$$C_i = f(S_i, D_i, D_j, I_i) \quad (1)$$

Here, C_i represents region i's casino status, S_i represents factors that affect the decision of casino operators to supply casinos to the region, D_i represents characteristics of region i that influence the region's willingness to permit casino gambling, D_j represents factors outside region i that influence i's demand for casinos, and I_i represents institutional factors that have had an influence on casino locations.

The period of analysis is from 1990 to 2000. The wave of casino gambling expansion was triggered by the 1988 passage of the IGRA. In 1989, Iowa became the first state to legalize non-Native American casinos, with its first casino opening in 1991. Nevada, New Jersey, Hawaii, Alaska, and the District of Columbia are omitted from the analysis. Much of the data on initial conditions in each county comes from the U.S. Census Bureau's Census of Population and Housing, *1990 Census*. A few counties already had casinos by then: Deadwood, SD, opened casinos in November 1989, and a small number of counties already had Native American casinos. Since 2000, most of the growth of gambling in the United States has come in the form of an increase in casino size rather than an increase in the number of locations.

The unit of observation is the county. The ease of data availability for counties and the recognition that county governments are likely to play an important role in the casino decision are important factors in the decision to use counties as the unit of analysis. Using counties also provides the opportunity to distinguish between intrastate and interstate effects. If the effects of casino gambling are concentrated in a smaller area than the county, or if the influence of municipal governments is much stronger than the influence of the county government, the predictive power of the model

will be somewhat weaker than might be hoped. The data set used in the analysis reported in this article has 3,072 counties. A total of 175 Native American casinos are spread over 132 counties and 182 non-Native American casinos are spread over 61 counties. Five of these counties contain both types.

The dependent variable is a categorical variable representing the possible casino outcomes. Four possible states exist: no casino, Native American casino, non-Native American casino, or both types of casino. A casino is defined in this article as a facility that has Class III-style gaming, as defined under the IGRA, except for racetrack-only facilities. This definition includes card clubs but excludes facilities such as convenience stores that have video lottery terminals. When a county decides to open a casino, it must also make decisions about the amount of gambling activity it will allow and the type of market structure that will prevail. Certainly differences exist among the gaming town of Biloxi, Mississippi, with its nine large casinos containing a total of more than 17,000 gaming positions; Mashantucket, Connecticut, home of the 340,000-square-foot Foxwoods Casino; and Prescott, Arizona, with its two small Native American casinos totaling 900 positions. Although understanding these differences is important, this article focuses on the decision to allow casino gaming without regard to market structure.

The categorical nature of the casino variable suggests a multinomial logit specification of the following form:

$$\text{Prob}(\text{Casino}=m) = \Lambda(\beta' X) \qquad (2)$$

In this equation, m represents the different casino outcomes for each county. Because some factors have different influences on Native American casino adoption than non-Native American casino adoption, distinguishing between the two is important. Because only five counties have both types of casinos, making estimation problematic, these counties are dropped from the models estimated in the following sections, leaving three possible outcomes for the dependent variable. Λ represents the distribution function for the logistic distribution, and X is a vector of explanatory variables that influence the casino location process, as hypothesized in the preceding section.

Summary statistics for the explanatory variables are presented in exhibit 2[2] and separated by the county casino type—none, Native American, non-Native American, or both. Unless otherwise mentioned, the data from each county come from 1989 or 1990, right before the great wave of casino expansion in the 1990s. The average amount of gaming in each casino county type, as measured by the number of gaming positions, is shown in the first row of exhibit 2. Counties with Native American gaming tend to have fewer gaming positions than those with non-Native American casinos.

Key demand factors include the county population, county median income, and county religious characteristics. Population is expressed in natural logarithmic form. Casino counties in general are much more populous than noncasino counties; this statement is especially true for non-Native American casinos. Counties with Native American casinos average about 115,000 people, and counties with non-Native American casinos average about 425,000 people. Counties with no

[2] Variable names and data sources are presented in appendix B, exhibit B-1.

Exhibit 2

Variable Means and Standard Deviations for Casino and Noncasino Counties (1 of 2)

Variable	No Casinos in County	Only Non-Native American Casinos in County	Only Native American Casinos in County	Both Types of Casinos in County
GAMING POSITIONS		2,436 (3,333)	1,386 (1,716)	4,607 (3,760)
POP	67,047 (192,244)	425,990 (1,215,033)	114,974 (286,569)	752,156 (925,153)
MEDHINCOME	23,623 (6,252)	27,758 (8,361)	23,507 (5,235)	30,047 (4,222)
CATHRELIG	0.122 (.15)	0.200 (.14)	0.222 (.18)	0.183 (.015)
FUNDRELIG	0.279 (.22)	0.202 (.15)	0.097 (.07)	0.099 (.03)
UNEMP	0.061 (.028)	0.061 (.02)	0.076 (.04)	0.068 (.03)
VACANCY	0.147 (.10)	0.098 (.08)	0.195 (.14)	0.102 (.06)
MANUF	0.189 (.11)	0.182 (.06)	0.138 (.08)	0.131 (.04)
URBANPCT	0.353 (.30)	0.712 (.29)	0.383 (.29)	0.897 (.07)
FISCAL	0.031 (.13)	0.034 (.08)	0.029 (.12)	0.049 (.04)
FISCALCHG	43.88 (36.0)	38.21 (19.1)	42.943 (26.8)	62.08 (23.6)
NATIVEPOP	0.011 (.047)	0.004 (.004)	0.098 (.17)	0.010 (.005)
POP50IN	1,054,982 (1,310,205)	1,884,080 (2,799,788)	935,861 (1,544,529)	3,360,835 (5,128,634)
POP50OUT	354,818 (860,490)	949,285 (1,641,591)	137,107 (377,397)	96,452 (124,465)
NEARBYIN	0.015 (.12)	0.9018 (.13)	0.126 (.33)	1.00
NEARBYOUT	0.002 (.05)	0	0.023 (.15)	0.40 (.54)
COASTAL	0.088 (.28)	0.268 (.45)	0.276 (.45)	0.40 (.54)
RIVER	0.028 (.17)	0.321 (.41)	0.024 (.15)	0
lnLANDAREA	865 (1,018)	677 (672)	2,267 (2,782)	2,858 (2,746)
VOTEDEM	0.396 (.11)	0.461 (.09)	0.410 (.09)	0.421 (.06)
VOTEPEROT	0.203 (.72)	0.182 (6.25)	0.241 (.05)	0.206 (.05)

Exhibit 2

Variable Means and Standard Deviations for Casino and Noncasino Counties (2 of 2)

Variable	No Casinos in County	Only Non-Native American Casinos in County	Only Native American Casinos in County	Both Types of Casinos in County
RNORTHEAST	0.067 (.22)	0.038 (.18)	0.024 (.15)	0
REASTNORTHCENTRAL	0.137 (.34)	0.250 (.43)	0.212 (.41)	0
RWESTNORTHCENTRAL	0.196 (.40)	0.303 (.46)	0.260 (.44)	0.20 (.45)
RSOUTHATLANTIC	0.202 (.40)	0	0.016 (.12)	0.200 (.45)
REASTSOUTHCENTRAL	0.123 (.33)	0.125 (.33)	0.008 (.09)	0
RWESTSOUTHCENTRAL	0.159 (.36)	0.142 (.35)	0.024 (.15)	0
RMOUNTAIN	0.083 (.28)	0.053 (.22)	0.173 (.17)	0
RPACIFIC	0.031 (.17)	0.089 (.29)	0.283 (.45)	90.60 (.55)
N	2,884	56	127	5

Source: See appendix B

casinos, however, average just 67,000 people. Median income is about 15 percent higher in non-Native American casino counties but is about the same in Native American casino counties and noncasino counties. The religious makeup of the county population differs widely by casino category as well. Data on church membership and adherents come from the American Religious Data Archive (Bradley et al., 1992). That archive identifies church members and adherents for 133 different denominations. The work of Smith (1990) and Lehrer and Chiswick (1993) classifies religious participants as fundamentalist Christian, Catholic, or other. Noncasino counties have on average about 28 percent fundamentalist Christians and 12 percent Catholics, but casino counties of all types have many more Catholics and many fewer fundamentalist Christians.

Intraregional demand factors hypothesized to influence casino location include unemployment and housing vacancy rates, the fraction of manufacturing employment, the degree of urbanization, fiscal conditions, and the proportion of Native Americans. Unemployment and housing vacancy rates in 1990 were higher in counties that would adopt Native American gaming, but unemployment was not much different and vacancy rates were lower in counties that opened a non-Native American casino. Manufacturing employment in 1990 was about the same in noncasino and non-Native American casino counties but was much lower in Native American casino counties. The degree of urbanization in the county is measured as the percentage of residents living in an urbanized area. Approximately 35 percent of residents in noncasino counties lived in urban areas, compared with 38 percent in Native American casino counties and 71 percent in non-Native American casino counties. Fiscal health is measured by the ratio of county budget surplus or deficit

to total expenditures in 1987 and the percentage change in government expenditures from 1982 to 1987.[3] Differences between counties with and counties without casinos are small. As would be expected, Native American populations are much higher in counties that open Native American casinos—about 10 percent of the population versus about 1 percent in other counties.

Interregional demand factors that may affect casino locations include the nearby population and the proximity to other casino counties. Geographic Information System software was used to measure the population within 50 miles of the county border and to determine whether that population resided in the same state as the casino or in a different state. The average noncasino county has slightly more than 1 million residents nearby in the same state and 350,000 nearby across state lines. The average non-Native American casino county has about 1.9 million residents nearby in the same state and nearly 1 million residents nearby across state lines. Native American casino counties, in contrast, have fewer than 1 million residents nearby in the same state and fewer than 150,000 residents nearby across state lines. In some cases, reservation boundaries have served as a buffer against urban sprawl, so it is perhaps surprising that Native American casinos are not particularly likely to be near large populations. In addition, dummy variables were constructed for each county to represent whether they bordered on another casino county and whether that casino county was in the same state or a different one. In general, casino counties were more likely to be near other casino counties, both in the same and different states. This finding reflects the wide regional variation in gambling levels.

Some peculiar institutional factors have also played a role in casino expansion. One particularly important factor is the riverboat. To capture the role of riverboats, a dummy variable was constructed to represent whether a county bordered on the Mississippi River and another was constructed to represent whether a county bordered on an ocean, the Gulf of Mexico, or one of the Great Lakes. Casino counties are much more likely to border a coast, and non-Native American casinos are much more likely to border the Mississippi River than noncasino counties.

In addition, the model includes dummy variables for political attitude, county size, and region. Voter attitudes are measured by the way residents voted in the 1992 Presidential election.[4] The model examines whether gambling has been a partisan issue. The summary data show that casino counties tended to vote Democratic by a wide margin. County geographic size, measured as the natural log of square miles, is included because introspection suggests that the larger the county, the larger the likelihood a casino will fall within its borders. Native American casinos tend toward disproportionately large counties. Finally, dummy variables based on census divisions are included to capture regional diffusion effects.[5] Casino gambling has not spread evenly across the country. Some regions have been much more receptive to it than others. One possibility is that region dummies capture some unobserved differences in regional characteristics; a second possibility is

[3] These dates were chosen purely for ease of data availability.

[4] The 1992 election was chosen over the 1988 election because Ross Perot ran in 1992, adding an additional source of variation to the data.

[5] The Mid-Atlantic and New England regions are combined into one region. In the empirical results section, estimation is otherwise problematic because no non-Native American casinos exist in New England. By combining the two census divisions into one region, the algorithm used to estimate the logit model converges and produces consistent estimates.

a regional diffusion argument, in which a new policy or initiative gains popularity and spreads to neighboring communities. Berry and Berry (1990) find evidence of this sort of regional diffusion with state lotteries. In general, the level of gambling increases from the Northeast to the Southwest.

Empirical Results

A binomial logit model was used to produce maximum likelihood estimates for the parameters in equation (2). The results are presented in exhibit 3. Column 1A identifies the effect of various factors on the likelihood that a county would open a non-Native American casino; column 1B presents estimates for the effects of the same factors on the likelihood that a county would open a Native American casino. Clear differences exist between the two casino types. These parameter estimates measure the significance of the various supply, intraregional demand, interregional demand, and institutional factors outlined previously. In addition to computing parameter estimates, the model computes marginal effects. The nonlinear nature of logit estimation means that the marginal effect of a change in an explanatory variable depends on its level and the level of each

Exhibit 3

Logit Model Estimates (1 of 2)

Parameter	Multinomial Logit				Discrete Time Hazards	
	(1A) Non-Native American		(1B) Native American		(2)	
	Estimate (StdError)	Marginal Effect	Estimate (StdError)	Marginal Effect	Estimate (StdError)	Marginal Effect
Intercept	– 9.566** (4.10)		– 12.516*** (2.70)		– 9.631*** (1.92)	
lnPOP	0.818*** (.26)	0.007	0.749*** (.19)	0.020	– 0.603*** (.13)	0.003
MEDHINCOME	0.000051 (.00003)	0.000005	0.00008** (.00003)	0.000002	– 0.00005 (.00003)	– 0.000003
CATHRELIG	1.819 (1.59)	0.0001	1.150 (.87)	0.0004	0.126 (.64)	0.0006
FUNDRELIG	– 2.069 (1.62)	0.051	– 7.545*** (1.99)	– 0.143	– 3.171*** (1.00)	– 0.016
UNEMP	7.687 (7.31)	0.021	4.165 (3.69)	0.059	5.426** (2.65)	0.027
VACANCY	4.114 (2.54)	0.031	1.652 (1.09)	0.087	2.023** (.86)	0.010
MANUF	– 1.114 (2.48)	0.003	0.656 (1.83)	0.009	– 0.200 (1.32)	– 0.0009
URBANPCT	1.600 (1.15)	0.008	– 0.536 (.72)	0.023	0.783 (.53)	0.004
FISCAL	– 0.965 (1.76)	0.0003	0.676 (.77)	0.001	0.175 (.73)	0.0008
FISCALCHG	– 0.0096 (.008)	– 0.00008	0.004* (.003)	0.00002	0.001 (.002)	– 0.000005
NATIVEPOP	– 106.4** (54.51)	0.064	5.07*** (1.01)	0.181	3.169*** (.65)	0.016

Exhibit 3

Logit Model Estimates (2 of 2)

Parameter	Multinomial Logit				Discrete Time Hazards	
	(1A) Non-Native American		(1B) Native American		(2)	
	Estimate (StdError)	Marginal Effect	Estimate (StdError)	Marginal Effect	Estimate (StdError)	Marginal Effect
lnPOP50IN	– 0.472* (.27)	– 0.005	– 0.311** (.15)	– 0.014	– 0.343*** (.11)	– 0.0016
lnPOP50OUT	0.088** (0.04)	0.0002	0.018 (0.02)	0.0006	0.029* (.01)	0.0001
NEARBYIN	– 0.611 (1.16)	0.007	0.802* (0.38)	0.0186	1.18*** (.18)	0.0058
NEARBYOUT	– 13.19 (1773)	0.010	1.097 (0.88)	0.029	– 0.335 (.335)	– 0.0017
COASTAL	1.167** (.50)	0.012	1.025*** (.31)	0.033	0.811*** (.24)	0.0040
RIVER	1.813*** (.42)	0.018	0.211 (.66)	0.051	1.447*** (.28)	0.007
lnLANDAREA	– 0.389 (.29)	0.0002	0.382* (.19)	0.0007	– 0.130 (.14)	– 0.0006
VOTEDEM	0.026 (.02)	0.0001	0.019 (.02)	0.0004	0.011 (.01)	0.00005
VOTEPEROT	– 0.035 (.05)	0.0002	0.075** (0.03)	0.0006	0.04* (.02)	0.0002
EASTNORTHCENTRAL	2.648*** (.92)	0.018	2.199*** (.67)	0.050	1.273** (0.51)	0.006
WESTNORTHCENTRAL	3.678*** (.99)	0.00000	2.382*** (0.70)	0.057	1.677*** (.53)	0.008
SOUTHATLANTIC	– 12.44 (296.1)	– 0.008	0.896 (1.03)	– 0.023	– 0.852 (.88)	– 0.004
EASTSOUTHCENTRAL	2.678** (1.09)	0.019	2.509* (1.36)	0.054	1.711** (.72)	0.008
WESTSOUTHCENTRAL	2.823*** (1.08)	0.013	1.163) (.99)	0.036	0.828 (.64)	0.004
MOUNTAIN	3.881*** (1.29)	0.019	2.313*** (.77)	0.055	1.622*** (.59)	0.008
PACIFIC	3.811)*** (1.16)	0.035	3.740*** (.71)	0.099	2.294*** (.55)	0.011
TIME					0.580*** (.13)	0.003
TIMESQ					– 0.061*** (.01)	– 0.0003
N	3058				32610	
Likelihood ratio	611.20				– 828.21	

**Statistically significant at a 90-percent confidence level.*

***Statistically significant at a 95-percent confidence level.*

****Statistically significant at a 99-percent confidence level.*

Source: See appendix B.

other variable. The marginal effects presented here represent the mean marginal effect of a change in the explanatory variable on the probability that a county would adopt a particular casino type for each observation in this data set.

Of the supply factors, the county population is an important and statistically significant determinant of casino adoption. A 1-percent increase in population is associated with a 0.7-percentage-point increase in the probability that a non-Native American casino would open and a 2.0-percentage-point increase in the likelihood that a Native American casino would open.[6] As a practical matter, population is the most important factor in determining casino adoption. Local income has a statistically significant but very small positive effect on Native American casino adoption but no impact on non-Native American casinos. The proportion of Catholics in the county has no effect on casino adoption, but the proportion of fundamentalist Christians reduces the likelihood that a casino would open. Referring to religious affiliation as a supply factor is perhaps misleading. If fundamentalist Christians participate less in gambling, then clearly their low demand for casino gambling reduces the willingness of casino operators to supply gambling to the region; however, it is also possible that religious participation has its effects through the legislative process as well.

The second most important factor in casino adoption is the size of the local Native American population in the county. A 1-percent increase in the county proportion of Native Americans leads to an 18-percent increase in the likelihood of opening a Native American casino. The coefficient estimate for non-Native American casinos is negative and statistically significant. This finding is consistent with the hypothesis that casinos controlled by Native American tribes do a better job of keeping the casino profits in the local community. Tribes also may have an easier time clearing legislative hurdles.

The other demand characteristics of the local region have no statistically significant effect on casino adoption. Unemployment, vacancy rates, manufacturing, the degree of urbanization, and the fiscal health of the county are not statistically significant, except that the change in county expenditures has a weak positive association with Native American casino adoption. Because the change in county expenditures is theoretically a more important factor for non-Native American casinos, this result is likely to be anomalous. Taken together, these parameter estimates suggest that counties do not give much consideration to whether economic activity associated with a casino is primarily displacing other activity. Also worth noting is that the unemployment result is insignificant for both types of casinos. Recall that Native American casinos are located in counties with higher unemployment rates and that unemployment has been a persistent problem for Native Americans. The results here suggest that, although the coefficient on unemployment has the expected positive sign, the presence of a large number of Native Americans drives casino adoption more so than their high levels of unemployment.

Characteristics of neighboring communities do influence casino demand, however, and, as predicted, the effects differ by casino type. Exhibit 3 shows that access to a large population across state borders has a sizable and statistically significant effect on non-Native American casino adoption. A 1-percent increase in the population within 50 miles but across state lines leads to a marginal

[6] Remember that these are point estimates that may change substantially for larger changes in the explanatory variables.

increase of 0.02 percent in the probability of a casino opening. Note from exhibit 2 that substantial variation exists in the size of the nearby out-of-state population; therefore, this factor has considerable practical influence on casino locations. The size of the nearby out-of-state population, however, has no effect on the location of non-Native American casinos. Tribal governments do not have the same concerns that state and county governments have regarding where their patrons come from. A large population in nearby counties within the state has negative impacts on casino probabilities for both casino types. The model shows that if a neighboring in-state county opened a casino during the 1990s, the county was somewhat more likely to open a Native American casino during the period as well. A complete discussion of the interaction of neighboring casinos has an important dynamic component and is investigated further in the next section.

Some institutional factors have played a role as well. Access to the Mississippi River has had a significant influence on non-Native American casino adoption, but has had no effect on Native American casinos. Being near a coast has been important for both kinds of casinos, although few Native American riverboat casinos exist. One possible explanation is that coastal boundaries correspond with tourism and are thus desirable for both types of casinos. The geographic size of the county had a small positive effect on the likelihood of finding a Native American casino in the county. Places with high concentrations of Perot supporters were more likely to open Native American casinos, but the effect was small. Finally, some evidence of regional diffusion exists, because many of the regional dummies were statistically significant. In general, casino adoption was more likely to occur moving from the Northeast to the Southwest.

Exhibit 4 presents the predicted probability that selected counties would open a casino based on the results of the logit model presented in exhibit 3. The probabilities in the exhibit are the combined probability of opening either a Native American or non-Native American casino. These predicted probabilities provide some insight regarding the types of counties that would be most likely and least likely to open casinos. Of the 3,058 counties included in the model, 1,183 have a predicted probability of less than 1 percent. This large and diverse group is made up of primarily of rural counties in the northeast part of the country. Some counties with low predicted probabilities have in fact opened casinos. The 10 casino counties with the lowest predicted probability are all rural counties in remote areas of large states. Swain County, North Carolina, with a predicted probability of 0.6 percent, is representative of this group. Swain County, which is located in the Smoky Mountains, has a casino despite being nearly 50 miles from the nearest population centers of Asheville, North Carolina, and Knoxville, Tennessee.

Of the 59 counties with predicted probabilities above 50 percent, 37 have casinos. The highest predicted probability is actually a county without a casino—Apache County, Arizona, at 96.1 percent. Apache County derives most of its high probability for a casino opening from its 77-percent Native American population. The other counties with high predicted probabilities have a large concentration of Native Americans, such as Shannon County, South Dakota (p=95.8%); a very large population, such as Los Angeles County, California (p=94.2%); or some combination of both, such as St. Louis County (Duluth), Minnesota (p=74.5%). Among the noncasino counties with high predicted probabilities, several have strongly considered casino openings. In Cook County, Illinois, for instance, the state sold a license for a casino in the county, but the license has been tied up in the courts since 2003 with no signs of resolution.

Exhibit 4

Predicted Probabilities and Casino Status for Selected Counties

10 Lowest Predicted Probabilities for Casino Counties	Predicted Probability (%)
Ohio, Indiana	0.5
Swain, North Carolina	0.6
Massac, Illinois	0.6
Allen (Parish), Louisiana	1.1
Neshoba, Mississippi	1.1
Gilpin, Colorado	1.1
Bossier (Parish), Louisiana	1.3
Oneida, New York	1.6
Doniphan, Kansas	1.8
Teller, Colorado	1.9
10 Highest Predicted Probabilities for Casino Counties	**Predicted Probability (%)**
Shannon, South Dakota	95.8
Los Angeles, California	94.8
Rolette, North Dakota	89.2
Menominee, Wisconsin	80.6
Humboldt, California	77.6
King, Washington	77.0
Sioux, North Dakota	74.7
St. Louis, Minnesota	74.5
Orleans (Parish), Louisiana	73.6
La Paz, Arizona	69.1
10 Highest Predicted Probabilities for Noncasino Counties	**Predicted Probability (%)**
Apache, Arizona	96.1
Todd, South Dakota	92.0
McKinley, New Mexico	83.1
Imperial, California	76.2
Navajo, Arizona	76.0
Cook, Illinois	75.5
Orange, California	69.7
Glacier, Montana	66.5
San Francisco, California	65.6
Lane, Oregon	63.9

Note: Predicted probabilities of a casino opening based on logit model in exhibit 3.

Testing for Cross-Border Competition

A prime reason for examining the factors that influence casino adoption is to gain an understanding of whether interaction between neighboring regions leads to an overexpansion of gambling. The existence of negative externalities associated with gambling suggests a role for regulation, but competition between regional governments for gambling revenues has the potential to undermine the ability of a particular government to find the appropriate level of regulation. As mentioned previously, the potential for a prisoner's dilemma situation exists in the case of casino gambling.

The features of casino regulation in the United States also provide an opportunity to test whether regions are in fact engaging in this sort of destructive competition. The decision to allow casino

gambling is made at two levels: state and local. Both Native American and non-Native American casinos are regulated in some form at each level. In the prisoner's dilemma scenario, the cooperative outcome is better for society than the competitive one. State-level regulation represents a method of enforcing the cooperative outcome, but when nearby counties are across state lines, this creates the potential for an inferior noncooperative equilibrium.

The approach employed in this article to test for this type of interregional competition is a discrete time proportional hazards model. In this model, the probability that a location will open a casino is a function of three types of regressors. The first type is time. Probability changes directly as a function of time, and the nature of this relationship is given a functional form in the following equation. The second type of regressor does not vary over time. Each variable used in the previous multinomial logit model is included and treated as time invariant and pegged at its 1990 values. This approach is perhaps questionable, but it has the advantage of not introducing a source of feedback into the model. The third type of regressor is time variant and includes a dummy variable for identifying whether a casino has opened in a neighboring county in the state or across state lines. These dummy variables are the variables of interest. If cross-border competition exists, the coefficient estimate for opening a casino in a neighboring county across state lines should be positive.

The proportional hazards model takes the following form:

$$\text{logit}(h_{it}) = \log(h_{it}/(1-h_{it}) = \alpha(t) + \beta' x_{it} \quad (5)$$

Here, $\alpha(t)$ is the baseline hazards function and x_{it} is a vector of time variant or invariant explanatory variables. In the discrete time model, the risk set includes each county that has not opened a casino at each time interval. In this data set, annual intervals spanning 1990 to 2000 are used; therefore, a county that opened a casino in 1990 would appear once, and a county that never opened a casino would appear 11 times. When the data set has been expanded to include a time dimension, the estimation using maximum likelihood is straightforward. Logit is used here. The logit estimates and estimated marginal effects are in column 2 of exhibit 3.

The hazards function is estimated with a quadratic specification and suggests that after the initial wave of casino openings in 1990, the probability of a casino opening fell quite dramatically at first but has since leveled off. Estimates of the other parameters are similar to the estimates presented previously in columns 1 and 2 of exhibit 3. Note that the marginal effects are much smaller in magnitude; this trend reflects the fact that the probability of a casino opening now has a time dimension, and the effect of a factor on a casino opening at a particular time is smaller than its effect on a casino opening at any point in the period of observation. One difference is that unemployment and vacancy rates are now found to have a positive effect on casino adoption. The coefficient on the opening of casinos in bordering in-state counties is positive and significant. The estimated coefficient likely reflects the fact that when prohibitions on casino gambling fall in one part of the state, they tend to fall in other places in the state as well.

There is no evidence that counties are engaging in cross-border competition. The coefficient on the dummy variable representing a bordering county across state lines opening a casino is statistically insignificant and actually negatively signed. This result holds up even in models in which the river and coastal variables are dropped and in which the river, coastal, and region variables are dropped. This result is particularly interesting given the number of casinos that opened on the Mississippi

River just across the state border from each other. Riverboat casinos in St. Louis, Missouri, and East St. Louis, Illinois, as well as in Moline, Illinois, and Dubuque, Iowa, operate in the same market, for instance. Their close proximity, however, does not indicate cross-border competition. Rather, it is likely that they simply have other common characteristics that led to casino adoption. Given the role of riverboats and the Mississippi River in the early days of casino expansion, it should not be surprising that the casinos in the early adopting states located in the more populated areas along the Mississippi River. As a counter example, the five casinos located in northwest Indiana draw heavily on customers from the Chicago area, yet they have not induced the opening of a casino in Cook County. This study finds no evidence that the instances of nearby casinos across state lines arise as a result of cross-border competition.

Additional evidence in support of no competition is the fact that very few states see direct competition between Native American and non-Native American casinos inside their borders. Given the contentious nature of early Native American casinos, it is perhaps surprising that states do not respond to Native American gaming with casinos of their own. Of the 28 gambling states listed in exhibit 1, 19 have only one type of gaming. Casinos in the other 9 states do not generally operate in the same regions. Only five counties have both types of gaming; of those, three are geographically large counties in California. In Michigan, for instance, Native American casinos are scattered primarily in the northern part of the state and the Upper Peninsula, with non-Native American casinos located in downtown Detroit. California's Native American casinos are traditional scale casinos, but the non-Native American casinos are generally smaller card clubs with fewer than 200 gaming positions. Recall that the IGRA permits only Native American gaming that is already permitted in some form in the state. Yet states do not respond to Native American casinos with non-Native American casinos.

Although the potential for destructive competition across jurisdictions exists, this study finds no evidence that this type of competition is actually occurring.

Conclusions

This article examines the factors influencing casino adoption within counties. A number of patterns are observed. One important observation is that the decision on casino locations is different for Native American and non-Native American casinos. A large local population is the most important factor in both cases, but non-Native American casinos are also strongly attracted to large nearby interstate populations. Large numbers of Native Americans in the county predict Native American casino openings but crowd out non-Native American casinos. The Mississippi River and riverboat gambling in the early days of casino expansion has had a lasting influence on casino locations, although most riverboat casinos no longer leave the dock. Fundamentalist Christians have been successful at keeping out Native American casinos but have had no effect on non-Native American casinos. Some very weak evidence indicates that underemployed resources lead to casino adoption, but no evidence supports the idea that fiscal conditions play a role. Further research is necessary to determine how communities choose the level of gambling and structure of the market after they have decided to open the doors to casino gambling.

This article also investigates whether counties engage in cross-border competition. This type of competition has potentially important policy implications, because an inability to account for regional spillover effects has the potential to lead to overexpansion of casino gambling. This article, which employs a proportional hazards model to investigate the dynamics of casino expansion, finds no evidence that destructive cross-border competition is occurring.

Appendix A.
A Modified Grinols-Mustard Model of Casino Welfare Impacts

Grinols and Mustard (2001) developed an algebraic model outlining exactly what needs to be calculated to estimate the welfare effects of casinos. Their model is outlined here. Let e(d, p, u) represent the minimum expenditures required to achieve utility u when the consumer buys and sells at prices p and d represents the distance to the nearest casino. This expenditure function is strictly monotonic in u for any choice of d and p. Then for fixed distance d and prices p, e(d, p, u(x)) is a utility function that records utility in dollars. To the consumer of gambling services, the primary benefit of more casinos is closer proximity to the nearest one. Let superscripts represent two alternative states of the world, where 0=no casino and 1=casino. Then $e_i(d^1, p^1, u^1) - e_i(d^1, p^1, u^0)$ represents the change in expenditures (and utility) that results from moving from the no-casino state of the world to the casino state of the world. Assume further that a dollar of utility is the same for each household. Then:

$$\Delta W = \Sigma_i [e_i(d_i^1, p_i^1, u_i^1) - e_i(d_i^1, p_i^1, u_i^0)] \quad (A.1)$$

where i indexes households. Then equation A.1 represents the total change in welfare. Following Grinols and Mustard (2001), expand equation 3.1 in the following fashion:

$$\begin{aligned}
\Delta W &= \Sigma_i [e_i(d_i^1, p_i^1, u_i^1) - e_i(d_i^1, p_i^1, u_i^0)] \\
&= \Sigma_i [e_i(d_i^1, p_i^1, u_i^1) - p_i^1 x_i^1] \\
&\quad + \Sigma_i [p_i^1 x_i^1 - p_i^0 x_i^0] \\
&\quad + \Sigma_i [p_i^0 x_i^0 - e_i(d_i^0, p_i^0, u_i^0)] \\
&\quad + \Sigma_i [e_i(d_i^0, p_i^0, u_i^0) - e_i(d_i^1, p_i^0, u_i^0)] \\
&\quad + \Sigma_i [e_i(d_i^1, p_i^0, u_i^0) - e_i(d_i^1, p_i^1, u_i^0)] \quad (A.2)
\end{aligned}$$

Note that part of each term cancels with part of the previous term, except for the original expression in equation 3.1. This new expression has a useful interpretation. The first term represents consumption constraints in the presence of casinos (state of the world 1). The second term represents income effects associated with moving from the casino state to the no-casino state. The third term represents consumption constraints in the absence of casinos. The fourth term captures the distance benefits associated with casinos, and the final term captures consumer surplus. The first and third terms referring to consumption constraints are zero under market clearing assumptions. In the presence of involuntary unemployment, for instance, the difference between the total expenditure it would take to reach the optimal bundle (p^1x^1) and the least costly way to reach the

optimal bundle ($e_i(d^1, p^1, u^1)$, by definition) captures the welfare impact of the constraint. Also, in the presence of underutilized capital, the presence of a casino that puts the capital to work would net a positive welfare impact. The sum of terms 1 and 3 provides the net change in welfare from changing from the no-casino state of the world to the casino state of the world.

Next, consider the household budget constraint:

$$p_i x_i = \Sigma_j \theta_{ij} \Pi_j + p_\Omega \Omega + T_i + E_i \tag{A.3}$$

where θ represents the household share and Π represents the profits of firm j, Ω represents the household endowment, T represents taxes, and E is the household share of gambling-induced externality expenditures. Summing across households, differencing across states of the world, and substituting A.3 into A.2 yields the following expression:

$$\begin{aligned}
\Delta W &= \Sigma_i [e_i(d_i^1, p_i^1, u_i^1) - e_i(d_i^1, p_i^1, u_i^1)] \\
&= \Sigma_i [e_i(d_i^1, p_i^1, u_i^1) - p_i^1 x_i^1] \\
&\quad + \Sigma_i [p_i^0 x_i^0 - e_i(d_i^0, p_i^0, u_i^0)] \\
&\quad + \Sigma_j \Delta\Pi_j + \Delta p_\Omega \Omega + \Delta T + \Delta E \\
&\quad + \Sigma_i [e_i(d_i^0, p_i^0, u_i^0) - e_i(d_i^1, p_i^0, u_i^0)] \\
&\quad + \Sigma_i [e_i(d_i^1, p_i^0, u_i^0) - e_i(d_i^1, p_i^1, u_i^0)]
\end{aligned} \tag{A.4}$$

This expression is an identity that provides a complete accounting framework for cost-benefit style studies. The first two terms in A.4 represent constraints that keep consumers from reaching their optimum bundle, such as structural unemployment. The third term represents the change in business profits, including the casino industry and all other businesses. The fourth term represents changes in the value of endowments, such as worker skills and land or house prices. The fifth term represents changes in taxes. The sixth term represents changes in externalities. The seventh term represents benefits provided to gamblers due to the increased availability of gambling. The final term represents changes in consumer surplus due to other changes in the price vector.

For a region *k* within this closed economy, we can rewrite this as

$$\begin{aligned}
\Delta W_k &= \Sigma_{i \in k} [e_i(d_i^1, p_i^1, u_i^1) - p_i^1 x_i^1] \\
&\quad + [p_i^0 x_i^0 - e_i(d_i^0, p_i^0, u_i^0)] \\
&\quad + \Sigma_j \theta_{ij} \Delta\Pi_j + \Delta p_{\Omega i} \Omega + \Delta T_i + \Delta E_i \\
&\quad + [e_i(d_i^0, p_i^0, u_i^0) - e_i(d_i^1, p_i^0, u_i^0)] \\
&\quad + [e_i(d_i^1, p_i^0, u_i^0) - e_i(d_i^1, p_i^1, u_i^0)]
\end{aligned} \tag{A.5}$$

where k indexes regions and $\Delta W = \Sigma_k \Delta W_k$. Here, p_i is the price vector facing individual i, including the wage; x_i is the chosen consumption bundle, including public services; d_i is the distance to the nearest casino; θ_{ij} is individual i's share of firm j; Π_j is the profits of firm j; T_i is the taxes facing firm i; Ω_i is individual i's endowment; and E_i is the cost of externalities facing individual i. Local governments are not likely to consider spillover effects and the interactions among communities. A

central planner would act to maximize (A.4) for the entire economy, but local planners would act to maximize (A.5) for their region.

Appendix B. Data Sources

Exhibit B–1

Data Sources for Casino Location Model

Variable	Description	Source
CASINO	Dummy variable identifying whether any casinos are in the county	www.gamblinganswers.com (n.d.) (Note: URL is now defunct.)
UNEMP	County unemployment rate, 1990	U.S. Census Bureau (1990b)
MANUF	Percent of employees in county employed in manufacturing industry, 1990	U.S. Census Bureau (1990b)
VACANCY	Percent of vacant housing units, 1990	U.S. Census Bureau (1990b)
DENSITY	Population per square mile, 1990	U.S. Census Bureau (1990b)
POP50IN	Population for census block groups within 50 miles of the county, inside the same state, 1990	U.S. Census Bureau (1990a, 1990b); Missouri Census Data Center (1997)
POP50OUT	Population for census block groups within 50 miles of the county, outside the same state, 1990	U.S. Census Bureau (1990a, 1990b); Missouri Census Data Center (1997)
NEARBYIN	Dummy variable representing if a bordering in-state county has a casino	Casino locations from www.gamblinganswers.com (n.d.) (Note: URL is now defunct.)
NEARESTOUT	Dummy variable representing if a bordering out-of-state county has a casino	Casino locations from www.gamblinganswers.com (n.d.) (Note: URL is now defunct.)
FISCAL	Ratio of county government revenues-expenses/expenses	UVA Library Geostat (2000).
FISCALCHG	Percentage change in county expenditures, 1982 through 1987	UVA Library Geostat (2000).
VOTEPEROT	Percentage of Ross Perot votes for president, 1992	UVA Library Geostat (2000).
VOTEDEM	Percentage of Democratic votes for president, 1992	UVA Library Geostat (2000).
RELIG	Percentage of county residents adhering to fundamentalist Christian religions, 1990	Bradley et al. (1992)
NATIVEAMER	Percentage of county residents of American Indian/Alaska Native race	U.S. Census Bureau (1990b)
MEDHINCOME	County median household income	UVA Library Geostat (2000).

Acknowledgments

The author thanks Dan McMillen, Barry Chiswick, Joe Persky, Gib Bassett, John Tauras, Erick Howenstine, Wei-Choun Yu, Denise Konan, seminar participants at St. Cloud State University and the Western Regional Science Association, the editor, and the referee for helpful comments. He gratefully acknowledges support from the U.S. Department of Housing and Urban Development Doctoral Dissertation Research Grant Program. Any errors are those of the author.

Author

Michael Wenz is assistant professor of economics at Winona State University.

References

American Gaming Association. 2006. *State of the States: The AGA Survey of Casino Entertainment.* Washington, DC: American Gaming Association.

Berry, Frances S., and William D. Berry. 1990. "State Lottery Adoptions as Policy Innovations: An Event History Analysis," *The American Political Science Review* 84 (2): 395–415.

Bradley, Martin B., et al. 1992. *Churches and Church Membership in the United States.* Washington, DC: Glenmary Research Center. http://www.thearda.com/Archive/Files/Descriptions/CMS90CNT.asp (accessed February 12, 2006).

Chicago Sun-Times. 2004. "Rosemont's the Right Place for Casino," April 26. http://www.findarticles.com/p/articles/mi_qn4155/is_20040426/ai_n12543035 (accessed May 20, 2006). (Note: URL is now defunct.)

Eadington, William R. 1999. "The Economics of Casino Gambling," *Journal of Economic Perspectives* 13 (3): 173–192.

Erekson, O. Homer, et al. 1999. "Factors Influencing the Adoption of State Lotteries," *Applied Economics* 31: 875–884.

Evans, William N., and Julie H. Topoleski. 2002. The Social and Economic Impact of Native American Casinos. NBER Working paper no. W9198.

Felsenstein, Daniel, and Daniel Freeman. 2001. "Evaluating the Effects of Cross Border Competition: The Case of Gambling in Israel and Egypt," *Journal of Tourism Research* 22 (5): 511–521.

Felsenstein, Daniel, Laura Littlepage, and Drew Klacik. 1999. "Casino Gambling as Local Growth Generation: Playing the Economic Development Game in Reverse?" *Journal of Urban Affairs* 21 (4): 409–421.

Gambling Answers. n.d. http://www.gamblinganswers.com (accessed October 28, 2003). (Note: URL is now defunct.)

Garrett, Thomas A., and Cletus C. Coughlin. 2008. Inter-temporal Differences in the Income Elasticity of Demand for Lottery Tickets. Working paper series 2008. Social Science Research Network: http://ssrn.com/abstract=1020737 (accessed June 4, 2008).

Grinols, Earl L., and David B. Mustard. 2001. "Business Profitability Versus Social Profitability: Evaluating Industries With Externalities, The Case of Casinos," *Managerial and Decision Economics* 22: 143–162.

Grinols, Earl L., and J.D. Omorov. 1996. "Development or Dreamfield Delusions? Assessing Casino Gambling's Costs and Benefits," *Journal of Law and Commerce* (3): 58–60.

Lehrer, Evelyn L., and Carmel U. Chiswick. "Religion as a Determinant of Marital Stability," *Demography* 30 (3): 385–404.

Mason, Paul M., Stephen L. Shapiro, and Mary O. Borg. 1989. "Gaming Tax Incidence for Three Groups of Las Vegas Gamblers," *Applied Economics* 21 (9): 1267–1277.

Missouri Census Data Center. 1997. MABLE/Geocorr90 Geographic Correspondence Engine Version 3.03. http://mcdc2.missouri.edu/websas/geocorr2k.html (accessed February 12, 2006).

Neibergs, Shannon. 2007. Spatial Characteristics of Gambling Expansion—An Analysis of Cross Border Effects. Working paper presented at the Conference on the Growth of Gambling and Prediction Markets, UC-Riverside, May.

Shroder, Mark. 1995. "Games the States Don't Play: Welfare Benefits and the Theory of Fiscal Federalism," *Review of Economics and Statistics* 77 (1): 183–191.

Smith, Thomas. 1990. "Classifying Protestant Denominations," *Review of Religious Research* 31: 225–245.

University of Virginia (UVA) Library, Geospatial and Statistical (Geostat) Data Center. 2000. County and City Data Books. 2000 Edition. http://fisher.lib.virginia.edu/collections/stats/ccdb/ (accessed February 12, 2006).

U.S. Census Bureau. 1990a. 1990 Census of Population and Housing: Summary Tape File 1, United States, prepared 1991.

U.S. Census Bureau. 1990b. 1990 Census of Population and Housing: Summary Tape File 3, United States, prepared 1991.

U.S. Department of Labor (DOL), Bureau of Labor Statistics (BLS). 2006. *Industries at a Glance: Manufacturing: NAICS 31-33.* http://www.bls.gov/iag/manufacturing.htm (accessed February 12, 2006).

Walker, Douglas M. 2003. "Methodological Issues in the Social Cost of Gambling," *Journal of Gambling Studies* 19 (2): 149–183.

Wenz, Michael. 2007. "The Impact of Casino Gambling on Housing Markets," *Journal of Gambling Business and Economics* 1 (2): 100–120.

Data Shop

Data Shop, a department of Cityscape, *presents short articles or notes on the uses of data in housing and urban research. Through this department, PD&R introduces readers to new and overlooked data sources and to improved techniques in using well-known data. The emphasis is on sources and methods that analysts can use in their own work. Researchers often run into knotty data problems involving data interpretation or manipulation that must be solved before a project can proceed, but they seldom get to focus in detail on the solutions to such problems. If you have an idea for an applied, data-centric note of no more than 3,000 words, please send a one-paragraph abstract to david.a.vandenbroucke@hud.gov for consideration.*

Measuring the Drivers of Metropolitan Growth: The Export Price Index

Michael Hollar
U.S. Department of Housing and Urban Development

Anthony Pennington-Cross
Marquette University

Anthony Yezer
The George Washington University

Abstract

The Export Price Index (EPI) is a measure of exogenous price shocks to a city's export industries. Thus far the EPI has been used to estimate models of metropolitan statistical area employment demand and appears to capture exogenous demand shocks to the regional economy. This article explains the intuition behind and construction of the EPI. Glaeser (2008) has noted that because "the economic theory of cities emphasizes a search for exogenous causes of endogenous outcomes like local wages, housing prices, and city growth, it is unsurprising that the economic empirics on cities have increasingly focused on the quest for exogenous sources of variation." The EPI is such an exogenous cause. The EPI data discussed in this note are available through The George Washington University Center for Economic Research website at http://www.gwu.edu/~cer1/datasets/datasets.html.

Introduction

Modeling of metropolitan statistical area (MSA) economies has been hampered by the lack of a truly exogenous indicator of shifts in demand for regional product. Although an endless number of regional and national "demand shift" variables exist, including aggregate income, payrolls, output, government purchases, and employment, none of these are specifically related to a given MSA. Thus New York State output or income can be used to measure demand for output from Buffalo, but the same variable could also be used for Rochester or Syracuse. It is not surprising that researchers have resorted to identifying determinants of demand shifts through the use of exclusion restrictions (Carlino and Mills, 1987; Voith, 1998), which are less satisfying on theoretical grounds. As Carlino and Mills admit, "judgment and experimentation are entailed in specifying the (exogenous variables)." Unfortunately, no obvious indicator of growth in demand for MSA-specific output exists.

The Export Price Index (EPI) is a weighted index of export goods prices that enables researchers to identify exogenous demand shocks to the economy of an MSA. Urban development models, such as Henderson's (1988) system of cities model, assert the importance of a region's export industries. Regional economic development stems from the performance of a modest number of export industries, which produce goods for sale in national or world markets where they are price takers. Examples of base industries include Detroit's automotive industry and San Jose's high-technology industry. When these industries experience positive price shocks, the positive effects ripple throughout the local economy, and when the national and world prices of their products fall, output in industries producing for local consumption, particularly in the retail and service sectors, also shrinks. The theoretical principle that one of the major sources of shocks to an MSA economy is fluctuations in national and world prices of goods that the city exports is well established.

If we assume that the national price for industry output is exogenous and that a region's export industry cannot by itself affect its national output price,[1] fluctuations in the EPI can be regarded as demand shocks to which MSA output and employment are expected to respond positively. A price increase would be viewed as an indication of an increase in demand to which the export industry would respond by increasing output and employment because productivity is fixed in the short run. As will be discussed later, this result holds empirically.

Construction of the EPI

Construction of the EPI requires two types of data: national goods prices and MSA export employment by sector. The goods prices are collected from three sources: the Producer Price Index (PPI), the Consumer Price Index (CPI), and sector prices. Each of these price indexes is produced by the Bureau of Labor Statistics (BLS). The frequency and length of the price data determine the structure of the series. The current EPI series relies on annual price data from 1981 to 2000. The index, however, can be easily extended to quarterly or monthly frequencies and over longer time periods.

[1] Regional development models, such as Henderson's (1988) system of cities model, treat export price shocks as exogenous drivers of local output change.

Identification of MSA export employment by sector is the most challenging part of the EPI. Although multiple sources of local industry employment exist, the Quarterly Census of Employment and Wages (QCEW), the series formerly known as ES-202, is used to identify export industries and calculate export employment, as explained later in this discussion. The advantage of this series is its industry detail. QCEW data are available for the 4-digit Standard Industrial Classification (SIC) level pre-2000 and for the 6-digit North American Industry Classification System (NAICS) level, subsequently.[2] This level of detail is desirable because it creates more homogenous product categories. Other popular employment series, including the Bureau of Economic Analysis' Regional Economic Information System (REIS) and the Census Bureau's County Business Patterns, provide less industrial detail. In addition, the QCEW data are compiled from state unemployment insurance filings and, therefore, are a census of all employees covered by state unemployment insurance, whereas the REIS and County Business Patterns data are survey based.

The export base industries are identified using location quotients (LQs). An excellent discussion of the construction and use of LQs is found in Brown, Coulson, and Engle (1992). The LQ is the quotient of the fraction of total employment in a particular sector and the fraction of total U.S. employment in that sector. The LQ for industry *i* located in region *r*, is given by

$$LQ_{ir} = (e_{ir} / e_{r}) / (e_{i} / e). \quad (1)$$

An LQ exceeding 1 indicates that the region has a greater concentration of employment in that industry than the country as a whole. As interpreted throughout the regional economics literature, this indication implies that the industry produces more than required for local consumption and thus a portion of that industry's output is "exported" to other areas. In the most current version of the EPI, the LQs are calculated using 1999 QCEW employment data at the 4-digit SIC level.

Two groups of industries are excluded regardless of whether their LQ was greater than 1: (1) industries that produce strictly for local consumption, which includes court system activities, construction, and utilities, and (2) industries for which no price could be determined. The latter group primarily includes mining services, military hardware, and vague retail industries. The exclusion of these industries has little practical effect on the EPI because none represents a major metropolitan export industry.

The industry prices are then matched to the export industries. As mentioned previously, three BLS data sets on industry prices are used. The PPI is the primary source, used for approximately two-thirds of the more than 900 industries, covering the agriculture, mining, and manufacturing industries. The CPI and sector prices primarily cover the wholesale and retail trade and service industries.

After matching prices with industries, the prices are weighted using the industry's export employment. Export employment, x_{ir}, is the industry employment needed to produce only the portion of its output that is exported and is calculated as

$$x_{ir} = (1 - 1 / LQ_{ir}) * e_{ir} = (e_{ir} / e_{i} - e_{r} / e) * e_{i} \text{ if } LQ_{ir} > 1, \text{ and 0 otherwise.} \quad (2)$$

[2] Through 2000, BLS reported QCEW data using the SIC codes. Beginning in 2001, these data are reported using the NAICS codes.

Dividing an industry's export employment by the region's total export employment provides the industry's weight.

$$w_{ir} = x_{ir} / \sum_{i} x_{ir} \quad (3)$$

The LQs and weights used to create the index were computed using data on an area's industrial structure at a point in time—in this case, 1999. Holding the weights constant, this computation is done under the assumption that the fundamental structure of a city's export base changes slowly over time. Short-term variation in the weights used to calculate the EPI could easily be due to cyclical fluctuations at the national level and the local level. Some experiments were done with other base years and empirical results were found to be insensitive to the choice of base year within the time period studied. This finding is most likely because industrial structures change slowly over time, particularly at the aggregate MSA level.

Finally, the index is created by summing the weighted industry prices.

$$EPI_r = \sum_{r} w_{ir} * x_{ir} * P_i .$$

Extending the EPI to the Subregional Level

In addition to the availability of MSA-level EPI, separate series representing the central city and suburbs are also available. This extension requires only two adjustments. First, the new regions are defined. In this case, because metropolitan areas are defined along county borders, the central city is represented by the county of a metropolitan area's central city. The suburbs consist of the remaining counties in the metropolitan area, as defined by the Office of Management and Budget (OMB).[3]

Second, export employment is recalculated for the subregions. The central city and suburb EPI series also relies importantly on MSA-level LQs. This reliance on MSA-level LQs avoids biasing the indices with trade between the two areas, which would introduce an endogenous element to the otherwise exogenous measure. For each MSA-level export industry, export employment is calculated separately for the central city and suburbs, based on their share of MSA-level industry employment.

Although the extension here was to the subregional level, the concept could easily be applied to regions, such as counties and states, or even to countries. Similar modifications would apply; that is, (1) define the region and (2) calculate LQs and export employment. For international indices, the world competitive price would be substituted as well.

Scope of the Data

The current EPI series contains data both at the MSA level and at the city-suburb level from 1981 through 2000 for 77 metropolitan areas. Exhibit 1 lists the 77 MSAs with their 2000 employment levels. The metropolitan areas included in the sample are generally the largest MSAs in the United

[3] See OMB, 1999.

Exhibit 1

Metropolitan Areas[a] Included in EPI Data Set

MSA Name	2000 MSA Employment	MSA Name	2000 MSA Employment
Akron, OH PMSA	318,705	Lexington, KY MSA	266,130
Albuquerque, NM MSA	343,657	Little Rock-North Little Rock, AR MSA	305,878
Ann Arbor, MI PMSA	277,960	Louisville, KY-IN MSA	556,836
Atlanta, GA MSA	2,131,450	Macon, GA MSA	146,876
Atlantic-Cape May, NJ PMSA	178,795	Memphis, TN-AR-MS MSA	565,900
Austin-San Marcos, TX MSA	665,694	Milwaukee-Waukesha, WI PMSA	839,064
Baltimore, MD PMSA	1,195,287	Minneapolis-St. Paul, MN-WI MSA	1,705,376
Baton Rouge, LA MSA	302,391	Nashville, TN MSA	671,826
Birmingham, AL MSA	453,432	New Orleans, LA MSA	608,598
Boise City, ID MSA	224,873	New York, NY PMSA	4,139,454
Buffalo-Niagara Falls, NY MSA	538,014	Newark, NJ PMSA	946,689
Canton-Massillon, OH MSA	182,174	Norfolk-Virginia Beach-Newport News, VA-NC MSA	689,828
Charleston-North Charleston, SC MSA	241,249		
Charlotte-Gastonia-Rock Hill, NC-SC MSA	823,391	Oakland, CA PMSA	1,032,933
		Oklahoma City, OK MSA	529,217
Chattanooga, TN-GA MSA	228,411	Omaha, NE-IA MSA	413,869
Chicago, IL PMSA	4,067,246	Orlando, FL MSA	864,805
Cincinnati, OH-KY-IN PMSA	863,043	Philadelphia, PA-NJ PMSA	2,311,470
Cleveland-Lorain-Elyria, OH PMSA	1,147,800	Phoenix-Mesa, AZ MSA	1,580,155
Columbia, SC MSA	288,849	Pittsburgh, PA MSA	1,080,905
Columbus, OH MSA	855,733	Portland-Vancouver, OR-WA PMSA	963,029
Dallas, TX PMSA	1,964,430	Roanoke, VA MSA	140,556
Daytona Beach, FL MSA	153,595	Rochester, NY MSA	532,524
Denver, CO PMSA	1,165,355	Rockford, IL MSA	174,764
Des Moines, IA MSA	285,591	Sacramento, CA PMSA	724,557
Detroit, MI PMSA	2,089,830	St. Louis, MO-IL MSA	1,300,152
Fort Wayne, IN MSA	266,926	Salem, OR PMSA	143,562
Fort Worth-Arlington, TX PMSA	763,012	Salt Lake City-Ogden, UT MSA	702,284
Fresno, CA MSA	362,066	San Antonio, TX MSA	705,289
Gary, IN PMSA	254,469	San Francisco, CA PMSA	1,099,277
Harrisburg-Lebanon-Carlisle, PA MSA	347,189	Santa Fe, NM MSA	66,283
Houston, TX PMSA	2,037,414	Seattle-Bellevue-Everett, WA PMSA	1,385,893
Huntsville, AL MSA	175,800	Springfield, IL MSA	146,473
Indianapolis, IN MSA	860,475	Syracuse, NY MSA	334,543
Jackson, MS MSA	210,517	Toledo, OH MSA	317,533
Jacksonville, FL MSA	530,001	Tulsa, OK MSA	389,811
Kansas City, MO-KS MSA	944,655	Washington, DC-MD-VA-WV PMSA	2,689,825
Knoxville, TN MSA	321,272	Wichita, KS MSA	279,267
Lansing-East Lansing, MI MSA	218,270	Wilmington-Newark, DE-MD PMSA	304,952
Las Vegas, NV-AZ MSA	746,786		

EPI = Export Price Index. MSA = metropolitan statistical area. PMSA = primary metropolitan statistical area.

[a] Metropolitan areas are defined using 1999 Office of Management and Budget definitions.

States, ranging from 66,283 employed workers in Santa Fe, New Mexico, to more than 4 million in New York City and Chicago. The median city is Buffalo, New York, with employment of 538,014. Exhibit 2 provides summary statistics for the MSA-, central city-, and suburb-level EPIs by employment size. On average, the MSA-level EPI increased 3.69 percent annually across all MSAs. As might be expected, export prices increased more in larger metropolitan areas, not only at the MSA level, but also at the central city and suburb level. This increase indicates that favorable trade shocks may explain regional growth; that is, regions with larger price shocks grow faster.

Although one cannot confer a causal relationship from these descriptive statistics, Pennington-Cross (1997) has illustrated the importance of the EPI in modeling regional growth.[4] Exhibit 3

Exhibit 2

Annual Percentage Change in EPI by MSA Employment, 1981–2000

Employment Range	MSAs	Annual Change in		
		MSA-Level EPI (%)	Central City EPI (%)	Suburb EPI (%)
MSA Employment < 300,000	23	3.62	3.76	3.05
MSA Employment between 300,000 and 750,000	27	3.66	3.77	3.26
MSA Employment > 750,000	27	3.78	3.94	3.57
All MSAs	**77**	**3.69**	**3.83**	**3.31**

EPI = Export Price Index. MSA = metropolitan statistical area.

Exhibit 3

Using the EPI in a Reduced-Form Model of Employment Growth[a]

Dependent Variable: e_{rt}	MSA total employment[b]		
Variable	**Description**	**Coefficient**	**t-Statistic**
epi_{rt}	MSA Export Price Index	0.29*	12.2
ppi_t	Producer Price Index	– 0.27*	– 12.5
i_t	Short-term interest rate (6-month Treasury)	– 0.02*	– 3.3
l_t	Long-term interest rate (10-year Treasury)	0.10*	11.2
T_t	Time trend	0.06*	36.0
h_{rt}	Fair Market Rent for two-bedroom apartments[c]	0.01	0.7
el_{rt}	Household electricity rates[d]	0.00	1.5
$ccty_{rt}$	Central city crime rate[e]	0.01	0.6
$cmsa_{rt}$	MSA overall crime rate[e]	0.15*	3.3
$natw_t$	National average wage rate[b]	– 0.85*	– 22.5

EPI = Export Price Index. MSA = metropolitan statistical area.

** Significant at 95 percent.*

[a] Results from Pennington-Cross (1997). e_{rt}, epi_{rt}, ppi_{rt}, h_{rt}, $natw_t$ are in natural logs. Sample period: 1977–92.

[b] Bureau of Economic Analysis.

[c] U.S. Department of Housing and Urban Development.

[d] Typical Electric Bills, U.S. Department of Energy.

[e] Uniform Crime Index, Federal Bureau of Investigation.

[4] Pennington-Cross (1997) relied on a previous version of the EPI ranging from 1977 to 1992.

reproduces estimates of a reduced form model of MSA employment obtained by Pennington-Cross (1997). Importantly, the coefficient on the EPI is positive and significant, indicating that the EPI is indeed capturing demand shocks. Specifically, the results show that a 10-percent increase in export prices leads to a 3-percent increase in total employment in the MSA.

Conclusion

The Export Price Index provides a reliable and theoretically justified indicator of economic growth, which has been successfully demonstrated in the peer-reviewed literature. The index is also computationally easy to reproduce at different regional levels. These properties make the EPI useful in testing hypotheses about MSA development, particularly where structural estimation of area demand and supply effects is needed. An updated EPI could also play a useful role in forecasting growth of regional economies.

Authors

Michael Hollar is an economist at the U.S. Department of Housing and Urban Development, Office of Policy Development and Research, Economic Development and Public Finance Division.

Anthony Pennington-Cross is associate professor of finance at Marquette University, School of Business Administration.

Anthony Yezer is professor of economics and director of the Center for Economic Research at The George Washington University.

References

Brown, Scott J., N. Edward Coulson, and Robert F. Engle. 1992. "On the Determination of Regional Base and Regional Base Multipliers," *Regional Science and Urban Economics* 22 (4): 619–635.

Carlino, Gerald A., and Edwin S. Mills. 1987. "The Determinants of County Growth," *Journal of Regional Science* 27 (1): 39–54.

Glaeser, Edward L. 2008. The Economic Approach to Cities. HIER discussion paper #2149. Harvard University.

Henderson, Vernon. 1988. *Urban Development: Theory, Fact, and Illusion*. New York: Oxford University Press.

Office of Management and Budget (OMB). 1999. OMB Bulletin No. 99-04: Revised Statistical Definitions of Metropolitan Areas (MAs) and Guidance on Uses of MA Definitions (June 30).

Pennington-Cross, Anthony. 1997. "Measuring External Shocks to the City Economy: An Index of Export Prices and Terms of Trade," *Real Estate Economics* 25 (1): 105–128.

Voith, Richard. 1998. "Do Suburbs Need Cities?" *Journal of Regional Science* 38 (3): 445–464.

Graphic Detail

Geographic Information Systems organize and clarify patterns of human activity on the earth's surface and their interaction with each other. GIS data, in the form of maps, can quickly and powerfully convey relationships to policymakers and the public. This department of Cityscape *includes maps that convey important housing or community development policy issues or solutions. If you have made such a map and want to share it in a future issue of* Cityscape*, contact David Chase at david.e.chase@hud.gov.*

High-Risk Loans and Increasing Vacancy Rates

David E. Chase, U.S. Department of Housing and Urban Development

Recent turmoil in the housing and mortgage markets has heightened concerns about increasing risk of foreclosures and their impact on neighborhoods and communities. Neighborhoods affected by foreclosures and long-term vacancy can affect the value of homes in surrounding neighborhoods, the quality of life within communities, and the overall local economy. In response to such concerns, the U.S. Department of Housing and Urban Development (HUD) has developed spatial representations (maps) of the distribution of high-risk loans in various metropolitan areas. One such map, exhibit 1, represents Prince George's County, Maryland, a suburb of Washington, D.C. The map combines mortgage data from the Home Mortgage Disclosure Act (HMDA) with a relatively new vacancy data set from the U.S. Postal Service (USPS).

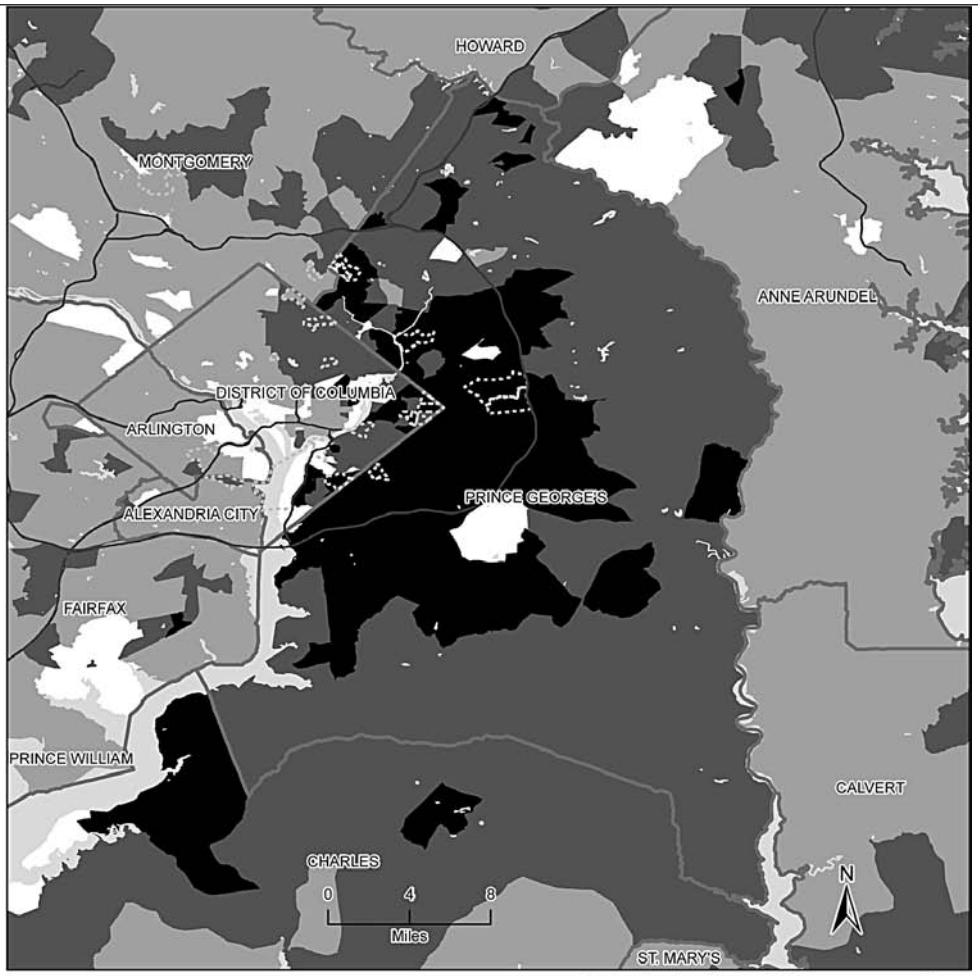
HMDA provides information at the census tract level on the number of loans originated and some of the terms of the loans. From the HMDA data HUD calculates the percentage of high-risk loans; that is, loans with both high-interest rates (more than 3 percentage points above a comparable Treasury security) and high leverage (loan-to-income ratios above 4). These percentages are computed for loans originated between 2004 and 2006. (Tracts with an insignificant number of mortgages are not included.) The tract-level percentages are indicated in gray scale on the map.

The map also illustrates areas that showed a significant increase in vacancy rates between December 2005 and June 2008. These data are based on address service data that USPS provided to HUD. Census tracts with a statistically significant increase (one standard deviation above the mean) in vacancy rates between December 2005 and June 2008 are outlined with a light gray dashed line. The text of the map includes additional details about this calculation.

Several census tracts in Prince George's County, Maryland, and Southwest Washington, D.C., have very high levels of high-risk loans (greater than 44 percent) and significant increases in vacancy rates. Although foreclosures are complex events that cannot be easily predicted with these data alone, it seems likely that these neighborhoods are at risk for increased foreclosures. Similar maps can be constructed for other areas because the data used are all publicly available. HMDA Loan Application Register data can be obtained from the Federal Financial Institutions Examination Council website at http://www.ffiec.gov/hmdafeedback/hmdaproducts.aspx. The USPS provides ZIP + 4-level data to HUD every quarter and HUD makes them available publicly at the census tract level. The data can be obtained from HUD at http://www.huduser.org/datasets/usps.html. Readers may address comments or questions to david.e.chase@hud.gov.

Exhibit 1

High-Risk Loans With Change in Vacancy Rate Through June 2008 by Tract
Prince George's County, Maryland, and Surrounding Areas



Legend

Percent of High-Risk Loans by Census Tract

- 0.42 - 23.92
- 23.93 - 43.80
- 43.81 - 97.47
- Vacancy Rate Increasing by 3.1% or more

Tracts colored medium and dark gray are areas with a significant level of high-risk loans, defined as where the rate spread is 3 percentage points above the Treasury security of comparable maturity and where loan-to-income ratios are equal to or above 4. Tracts colored white are excluded due to a statistically small number of home loans. Source: Home Mortgage Disclosure Act data for 2004 through 2006.

Tracts outlined with light gray are areas with a statistically significant (1 standard deviation above mean) increase in vacancy rates. Vacancy rates for tracts with total addresses below 300 are not shown. Tracts with vacancy rates of less than 5% for June 2008 are also not shown. Vacancy rates are determined by the difference between December 2005 and June 2008 U.S. Postal Service address service data.

Acknowledgments

The author thanks Todd McNeil, with KBM Group, Inc., and Robert Renner, U.S. Department of Housing and Urban Development, Office of Policy Development and Research, for designing and creating the map.

Industrial Revolution

The design of every home requires compromises among different and often competing goals: comfort, convenience, durability, energy consumption, maintenance, construction costs, appearance, strength, community acceptance, and resale value. Often consumers and developers make the trade-offs among these goals with incomplete information, increasing the risks and slowing the adoption of innovative products and processes. This slow diffusion negatively affects productivity, quality, performance, and value. This department of Cityscape *presents, in graphic form, a few promising technological improvements to the U.S. housing stock. If you have an idea for a future department feature, send your diagram or photograph and a few well-chosen words to dana.b.bres@hud.gov.*

Plumbing Manifolds: Circuit Breakers for Water

Dana Bres, U.S. Department of Housing and Urban Development

Over time, the status quo for distributing water in homes has been the use of pipes in decreasing sizes that branch out to water-using appliances in the home. The plumbing manifold, which acts like a circuit breaker for water, is a viable alternative to the status quo. The manifold saves money and natural resources.

The Status Quo

The typical American home uses a series of copper pipes of decreasing size to distribute water from the building point of entrance, branching off to service water-using appliances in each room. These copper pipes are larger (typically 3/4-inch or 1-inch diameter) where water service enters the home and then become smaller as the "branches" lead toward appliances. Some homes have polyvinyl chloride (PVC) water piping as an alternative to copper. In most homes, the plumbing system is installed using sections of rigid pipe cut to length and then joined with fittings using solder or solvent. About one-half of new homes use copper pipe.

Some disadvantages of the status quo for piping in homes are as follows:

- On a recent field evaluation in Lincoln, Nebraska, installing a copper plumbing system in a modest home required 36 labor hours (4.5 labor days).
- Leaks can occur during installation and later. Each fitting and connection must perform without fail. This performance is particularly important because most of the fittings and connections will be hidden behind walls and in ceiling spaces; repairs later will be both burdensome and costly.
- Energy and water are wasted when hot water is used. The water that flows from the tap while you wait for hot water is water that was once hot (requiring energy) and is now wasted as it runs down the drain. In addition to the environmental impacts, wasted water costs include the energy to heat the water, the cost of purchasing it, and the cost of disposing of it.

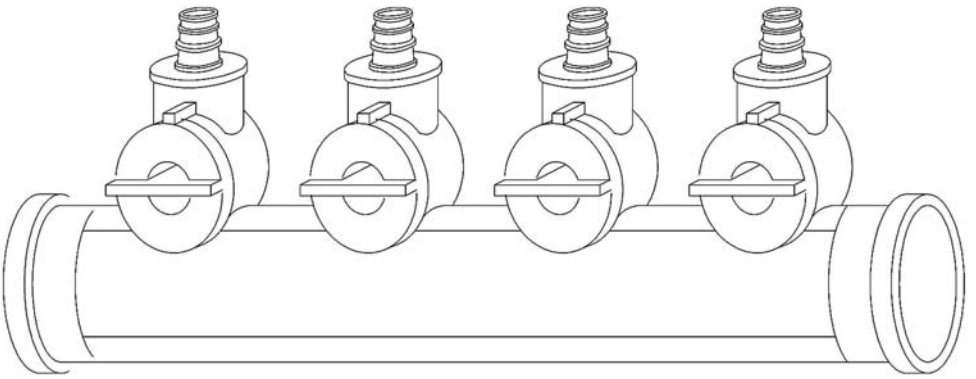
- Jobsite security has become a concern. As the cost of copper has increased, so have reports of jobsite theft, in which installed copper pipe is removed from homes under construction. In addition to losing the copper pipe, builders lose the labor associated with the installation and may have to repair other damage from the theft.

The Plumbing Manifold

Use of a plumbing manifold with flexible, cross-linked polyethylene (PEX) pipes provides a viable alternative to the rigid pipe discussed previously. With a manifold, the larger home water supply lines (both hot and cold) provide water to the manifold, which resembles an electrical circuit breaker in function. Most manifolds are about four inches wide and 12 to 18 inches tall and are wall-mounted near the water heater. Manifolds typically have a series of valves for each tube leaving the manifold (see exhibit 1). From the manifold, individual PEX water lines are run to each appliance in the home, through a separate control valve. Such systems have been described as using a "hub and spoke" approach.

Exhibit 1

Plumbing Manifolds



Some advantages of the manifold approach include the following:

- Cost of construction is reduced because significantly less labor is associated with the installation. The PEX tubing is installed from a large roll that allows for continuous sections with no connections or fittings in the walls or ceilings. In identical units in the Lincoln, Nebraska evaluation, PEX required about 20 labor hours, a savings of 2 labor days compared with the installation of copper pipes. If the Lincoln project comparison were done today, the cost savings would be even higher because the cost of copper has increased fourfold since 2003.
- Frequency and cost of maintenance are reduced because all the fittings are at accessible locations, the flexible tubes are naturally resistant to vibration, and the tubes possess some capacity to expand if the water freezes.

- Energy usage is reduced because the diameter of the PEX lines is smaller, which means less water must be flushed from the lines before hot water is delivered to the tap. Reducing the water waste saves energy, water, and the costs of the energy, water, and wastewater. Considering all costs, switching from 1/2-inch copper pipe to 3/8-inch PEX is estimated to reduce the water, wastewater, and energy costs by about 50 percent for those hot water-using appliances. (There would be no savings for the cold water system because the water is ready to use when the tap is opened.)

Other potential uses for manifolds and PEX piping could include applications in large homes or other buildings. For example, a larger, single cold water supply line could provide water to a remote bath and a tankless water heater. Plumbing manifold and PEX piping can reduce both the wait for and waste of hot water.

Manufacturers

A number of manufactures produce plumbing manifolds. The choices of which manifold to use will be based on local availability, cost, and familiarity of the system by the installers.

Sources

ToolBase TechSpecs: Home-Run Plumbing Systems.
http://www.toolbase.org/pdf/techinv/homerunplumbingsystems_techspec.pdf.

PATH Field Evaluation: Evaluation of Residential Water Distribution Piping Installation.
http://www.toolbase.org/pdf/fieldevaluations/brighton_plumbingreporttask1.pdf.

Additional Information

The PATH (Partnership for Advancing Technology in Housing) Technology Inventory on the toolbase.org website provides information on the use and sources of plumbing manifolds and PEX piping.