

Land Lines

Newsletter of the Lincoln Institute of Land Policy

GREATER PHOENIX 2100:

Knowledge Capital, Social Capital, Natural Capital

Frederick Steiner

The Sun Belt grew at spectacular rates in the late twentieth century, and among western U.S. cities Phoenix and its metropolitan region led the pack. The Census Bureau reports that between 1990 and 2000 Maricopa County was the fastest growing county in the nation at 44.8 percent, increasing from 2,122,101 to 3,072,149 people. The county is the fourth largest in the nation in terms of total population. During the 1990s, the city of Phoenix topped one million people and became the sixth largest U.S. city. Its spatial expanse has eclipsed that of the city of Los Angeles. According to the city's Planning Department data, the region is growing by about 63,000 residents per year and requires about 23,000 new housing units to meet the demand. Statewide, the population is growing by more than 2,000 residents per week, and the number of people in the state is expected to double in the next 20 years.



RAMÓN ARROWSMITH

Urban development abuts the South Mountains, a large municipal park.

The weather, relatively affordable housing and abundant jobs attract a diverse array of newcomers, but increased population has numerous social and environmental consequences. Debate rages about the impacts of growth locally and nationally: Is it good? Is it deleterious? Can it be sustained? At what cost? Who benefits? Who suffers?

A group of Arizona State University (ASU) faculty has recognized that these phenomena represent an opportunity for both research and public service in this fast-growing urban environmental laboratory. Furthermore, knowledge gleaned from such inquiries could lead to smarter growth and more livable places in the future. This notion provides the intellectual foundation for a project named Greater Phoenix 2100 (GP 2100), which seeks to provide data and analysis to the region's decision makers to help them make wise choices about the future.

Greater Phoenix 2100 Workshops

The Lincoln Institute helped ASU launch GP 2100 through workshops in April 2001 that brought together ASU faculty and staff, community leaders, national participants from institutions such as the Los Alamos National Laboratory and the National Research Council, and four distinguished speakers who stimulated debate and discussion. The panelists were ecologist and author Dan Botkin, professor emeritus of the University of California-Santa Barbara; Michael Crow, an authority on science policy and executive vice provost at Columbia University; political scientist Helen Ingram, formerly director of the Arizona Water Resources Research Center and now professor of human ecology at the University of California-Irvine; and Bob Yaro, executive director of the Regional Plan Association. They observed that for the Phoenix

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metropolitan region to continue to prosper, three overlapping spheres of influence must be considered: the creation of knowledge capital, the enhancement of social capital, and the preservation of natural capital.

The GP 2100 workshop panelists and other participants suggested that ASU should become the convener for discussions on growth, as well as the data bank for computer-stored geographical information about these intersecting, mutually dependent spheres. As a result, ASU should create various scenarios for the future in a “Sim Phoenix” format and a “Decision Theater” that would be a physical and a virtual place where academic and community leaders could probe the consequences of possible actions.

Databases and Audiences

Still in its early stages, ASU’s GP 2100 seeks to coordinate federal, state and academic information programs relating to the environment of the region. The project will be linked with similar studies in other metropolitan areas and global city regions (Simmonds and Hack 2000). GP 2100 will answer questions that people care about by providing objective, scientifically based information using state-of-the-art forecasting and decision tools and theories. Coupled with the Central Arizona/Phoenix Long-Term Ecological Research Project (CAP LTER) supported by the National Science Foundation, GP 2100 has the potential to launch a network of similar undertakings nationally and internationally.

GP 2100 will develop and present a wide variety of scientific and technical data on the past, present and possible futures of the Phoenix metropolitan region. The project builds on the premise that knowledge can be used to create better lives for future generations. GP 2100 will provide learning and research experiences to six major groups of people.

- Regional decision makers and community leaders. Many activities, including community visioning exercises and open space ballot initiatives, point to an acute need for regional leadership. Regional decision makers have identified the need for sound, long-term environmental information.

- The general public. GP 2100 will generate considerable interest within the

metropolitan Phoenix community. According to several opinion polls, the public is deeply concerned about growth, environmental quality, and the livability of their neighborhoods.

- Middle- and high-school students and teachers. The project will offer engaging learning opportunities for students and teachers about scientific and decision-making processes. The multiscale aspect of the project will enable teachers to illustrate how specific neighborhoods are connected to regional systems.

- ASU faculty. GP 2100 will be an umbrella and a catalyst for researchers studying the urban ecologies of the region. It will provide the opportunity to explore the integration of scientific information, the examination of new technologies for representation and visualization, and a platform for advancing modeling and decision theory.

- ASU students. Both undergraduate and graduate students will be engaged in GP 2100’s unique multidisciplinary studies that will contribute to an improved quality of life in the region.

- Future generations. The century-long approach means that there will be several generations of audiences.

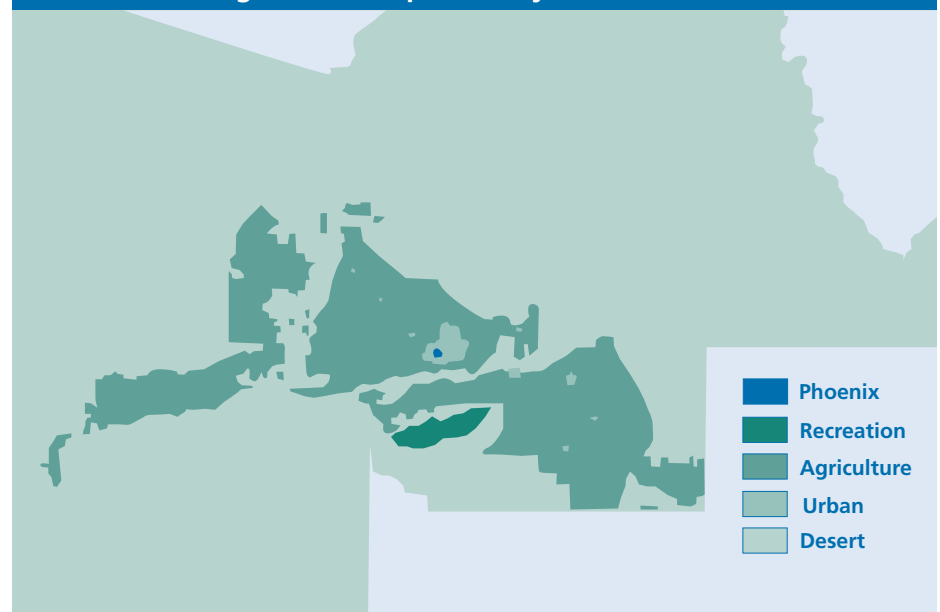
Goals and Benefits

The goal of GP 2100 is to make the best possible scientific and technical information available in ways that will enable wise, knowledge-based decision-making that can shape the region during the next 100

years. This time frame presents a purposefully longer-term view of the metropolitan region than has previously been developed. While short-term visioning is limited by immediate considerations, a century-long perspective requires the incorporation of multigenerational concerns and changes in technology. A 100-year time frame also allows for evaluation of impacts of such geologically common events as droughts, major floods and gradual climate changes. In short, GP 2100 will be a strong scientific resource for consideration of the region’s long-term prospects and for creating the kind of future its residents want.

Two types of benefits will flow from the project. The first relates to the future quality of life in the region. An underlying assumption of GP 2100 is that better information will lead to wiser decision-making that will, in turn, result in healthier, more livable communities. Metropolitan Phoenix is expected to double from 3 to 6 million people in the next 20 or 30 years. Meanwhile, the global population will increase from 6 to 9 billion people and will become more urban. Such growth poses many challenges relating to land use, transportation, open space, biodiversity, urban design, recreation, employment, equity, air quality, water quality and quantity, and the overall quality of life of city regions. The GP 2100 effort will be beneficial to those who are addressing these concerns in Phoenix by providing a prototype of how science-based tools and a regional perspective can better inform

Land Use Change in Maricopa County, 1934



Source: Adapted from CAP LTER Historic Landuse Phase 1 Report, 1998.

long-term decision-making. By viewing the Phoenix region as an urban environmental laboratory, the lessons learned will have implications for the broader scientific and policy communities.

GP 2100 will also be an asset for ASU researchers and students, who will have the opportunity to collaborate in multidisciplinary teams and will have access to state-of-the-art GIS and visualization technologies. New and emerging theories in urban and landscape ecology, decision science, land use and environmental modeling, and biocomplexity will be explored.

Special Features

Several linked products are envisioned to flow from GP 2100. Existing data can be coalesced into a dynamic warehouse of continuously updated regional information. Such a data repository can be presented to the public through an Urban eAtlas, which will be made available in electronic and more conventional forms to provide documentation of existing conditions and enable the construction of future scenarios. The digital version will be available on-line so it may be continuously accessed and updated.

The data archives and Urban eAtlas will contribute to a third major product: Sim Phoenix, an interactive computer game that can help researchers, citizens and decision makers visualize the consequences of “what if” scenarios. Sim Phoenix is a step toward the creation of an even more ambitious visualization project: a Decision

Theater where local leaders, citizens, students and researchers can explore future options for the region. The Decision Theater will be a physical space in which scientific data, group dynamics and interactive computer technology are used to develop simulations of the region’s futures and considerations of their consequences. The simulations and their representations will evolve with new computational and representational technologies as well as with new scientific information.

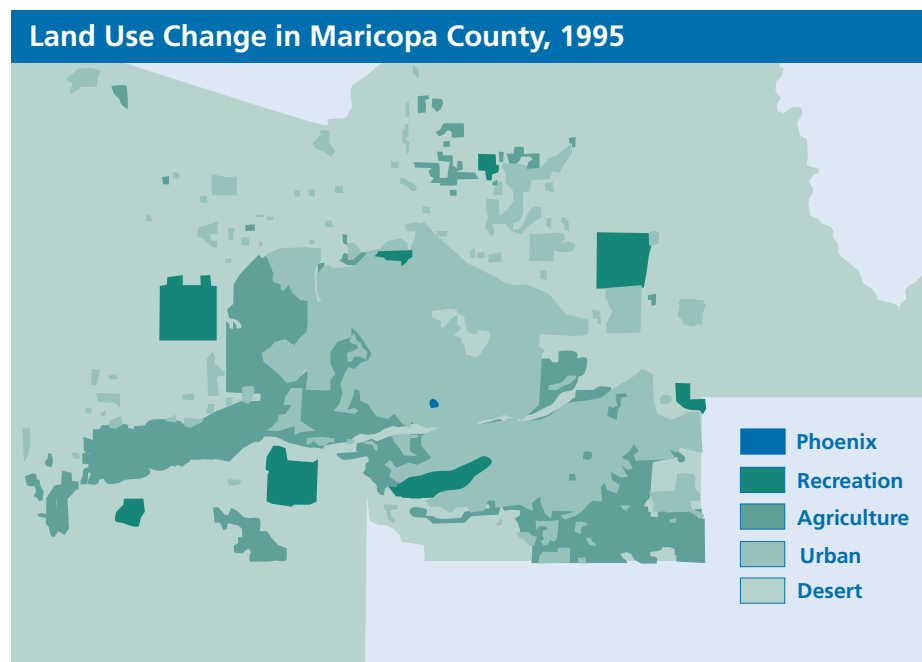
GP 2100 will complement and augment existing long-term monitoring activities being conducted at ASU, such as the CAP LTER project, one of only two such urban LTER sites in the nation. Launching a satellite in cooperation with NASA is one monitoring possibility. This “Phoenix-Sat” would pass over the region twice daily, enabling diurnal measurements of such dynamic parameters as traffic, air quality, soil moisture and construction. It is possible that the Phoenix-Sat could be part of a larger international remote-sensing program for urban resource monitoring. Tools such as the data archives, Urban eAtlas, Sim Phoenix, the Decision Theater and Phoenix-Sat will enable scholars and decision makers alike to probe the major issues that metropolitan areas like Phoenix will face in the coming century. As a result, problems may be foreseen and avoided and opportunities pursued with vigor.

Faculty in the life, physical and social sciences at Arizona State University are currently compiling a comprehensive suite

of information about the region. Planners, policy analysts and educators also could identify a series of key response variables and parameters for a Decision Theater. Computer scientists could program this complex information so that it can be displayed in both two- and three-dimensional formats, as well as animated views illustrating changes through time. The data could be automatically updated from dynamic government and university databases, from hundreds of sensors throughout the metropolitan region, and from orbiting satellites.

In this first-of-its-kind Decision Theater, high quality audio and visual presentation systems will include a 180-degree screen, which provides an immersive, synthetic environment along with comfortable ergonomics. This arrangement enables decision makers and researchers to come together to explore, debate and analyze options for the future. The Decision Theater is capable of high-resolution stereoscopic viewing using shuttered glasses. A visitor can have her or his viewing position tracked (“head-tracking”), giving the impression of truly walking within the data and data results, pondering the possible landscapes of the future from different angles. It could be associated with an innovative Planetary Imaging Faculty set up jointly by ASU and the Jet Propulsion Laboratory, as well as dance and visual representation projects from ASU’s Institute for Studies in the Arts. While real-time interaction with data and models in the Decision Theater is engrossing, a comparably rich on-line experience is also possible through the use of web-based multimedia, text, data download and upload, and modeling tools. The virtual Decision Theater allows a participant to interact with a Sim Phoenix-like game.

How will the Decision Theater be implemented? Four interactive parameters appear especially crucial for modeling the future: water availability, air quality, open space and land use. ASU and its community and government partners already possess an enormous storehouse of data on these parameters, but the challenge is to combine the data in meaningful ways. To this end, the Greater Phoenix 2100 team, in conjunction with the Arizona Department of Water Resources and the U.S. Geological Survey, is now developing a water availability prototype that would use the hydrologic cycle to model regional



Source: Adapted from CAP LTER Historic Landuse Phase 1 Report, 1998.

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water availability using factors of precipitation, supply, evaporation and demand to illustrate water futures both graphically and spatially.

A Model for Other Metropolitan Regions

Generations of citizens and scholars will benefit from Greater Phoenix 2100. The project will result in products that will help community and business leaders make wiser decisions. It will assist local, state, and federal officials in planning and designing programs and policies. The project will aid teachers and students in their understanding of natural and social processes. Greater Phoenix 2100 presents uniquely complex targets for technological, scientific and policy analysis advancements. It will produce and facilitate interaction with massive, typically disparate, datasets. Because its major components are easily transferable to other urban regions, the project can provide a model for other places interested in pursuing similar initiatives. In this century, some two-thirds of the world's population will live in urban areas. Greater Phoenix 2100 has far-reaching implications concerning the application of knowledge capital to regional and urban decision-making in order to maximize social capital while maintaining the natural capital of the metropolitan region. **L**

Frederick Steiner, an internationally recognized expert on environmental planning, is dean of the School of Architecture at the University of Texas at Austin. He was formerly professor and director of the School of Planning and Landscape Architecture at Arizona State University. Contact: steiner@mail.utexas.edu.

REFERENCE

Simmonds, Roger and Gary Hack, editors. 2000. *Global City Regions: Their Emerging Forms*. London: Spon Press.

Program Calendar

Contact: Lincoln Institute, 800/LAND-USE (800/526-3873) or help@lincolninst.edu, unless otherwise noted. Consult www.lincolninst.edu for additional information about these programs.

National Conference of State Tax Judges

SEPTEMBER 13–15
Salt Lake City, Utah

Colonias: Irregular Settlements and Self-Help Housing in the U.S.

SEPTEMBER 21–22
Lincoln House
Cambridge, Massachusetts

City Planning Directors

Cosponsored with Harvard University
Graduate School of Design
SEPTEMBER 26–28
Lincoln House
Cambridge, Massachusetts

Informal Land Markets: Regularization and Upgrading

OCTOBER 8–12
Lincoln House
Cambridge, Massachusetts

Conference in Honor of Dick Netzer

OCTOBER 11–12
New York University
New York, New York

Land Use in America

OCTOBER 25–26
Lincoln House
Cambridge, Massachusetts

Redesigning the Edgeless City

OCTOBER 29
Lincoln House
Cambridge, Massachusetts

Mediating Land Use Disputes I

NOVEMBER 1–2
Humphrey Institute of Public Policy
University of Minnesota
Minneapolis, Minnesota

State and Local Taxation Seminar for Governors' Aides

Cosponsored with the National Governors' Association
NOVEMBER 2
Lincoln House
Cambridge, Massachusetts

Valuing Land Affected by Conservation Easements

NOVEMBER 13
Lincoln House
Cambridge, Massachusetts

Urban Land Markets in Latin America: Policy and Development

NOVEMBER 26–30
Lincoln House
Cambridge, Massachusetts

Mediating Land Use Disputes I

DECEMBER 6–7
Lincoln House
Cambridge, Massachusetts

Lincoln Lecture Series

Lincoln House, 113 Brattle Street, Cambridge, MA. 12 noon. The programs include lunch and are free, but pre-registration is required.

Contact: help@lincolninst.edu

Enabling Housing Markets

SEPTEMBER 14
Shlomo Angel
Housing Policy and Urban Development
Libra, Inc., New York, NY

Land Tenure Regularization in Latin America: A Critical Assessment of de Soto's "The Mystery of Capital"

OCTOBER 10
Edésio Fernandes
Development Planning Unit,
University College London

Property Taxation in Developing Countries: An Assessment in 2001

OCTOBER 23
Roy W. Bahl
Andrew Young School of Policy Studies,
Georgia State University, Atlanta

Planning and the Wealth of City Regions

NOVEMBER 6
Frederick Steiner
School of Architecture, University of Texas
at Austin

Cities' Strategic Land Behavior

DECEMBER 3
Ann Bowman
Department of Government and International
Studies, University of South Carolina, and
Michael A. Pagano
College of Urban Planning and Public
Affairs, University of Illinois at Chicago