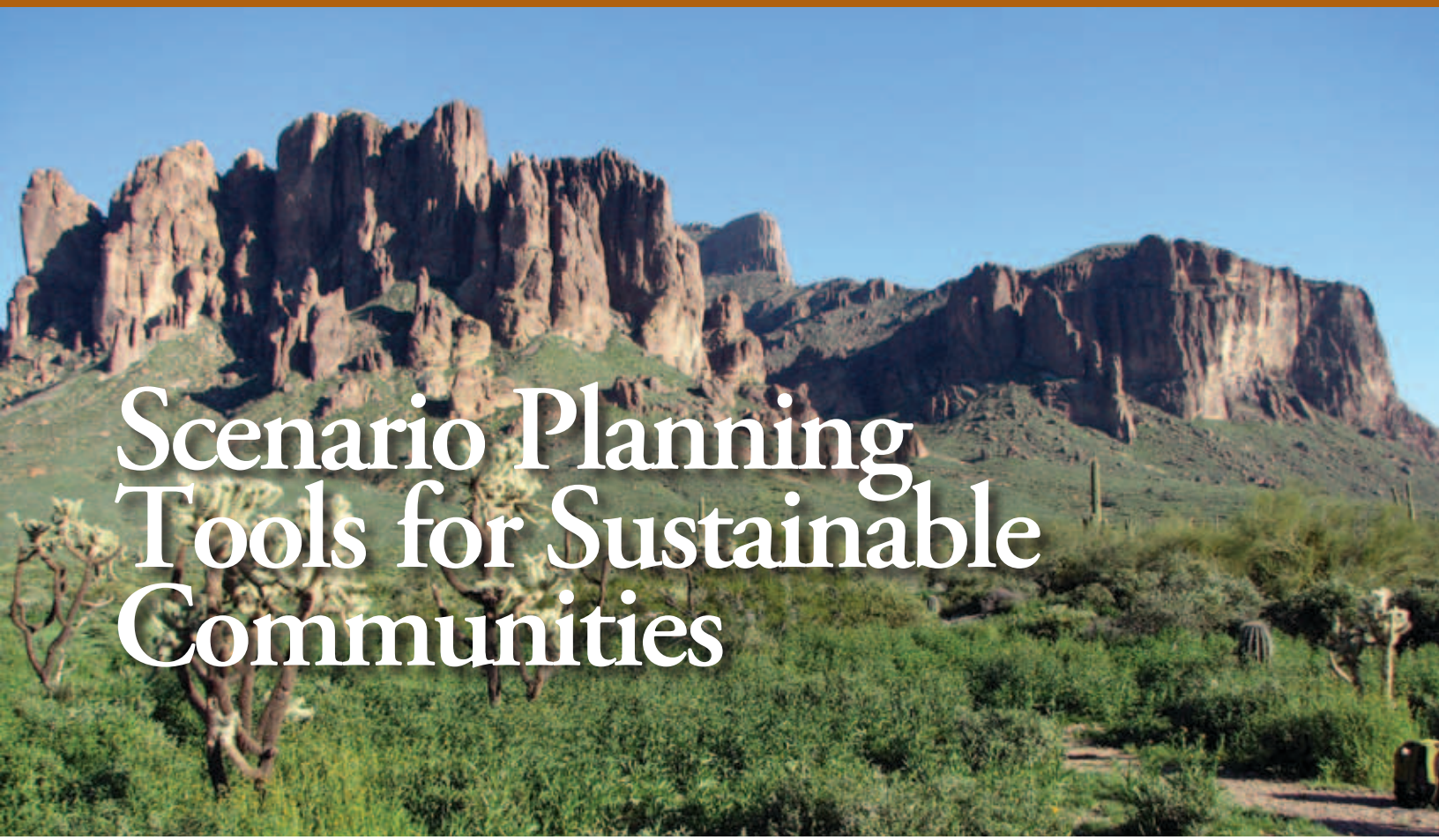


Scenario Planning Tools for Sustainable Communities

Courtesy of Superstition Vistas Steering Committee

Foothills of the Superstition Mountains in the northeastern corner of the Superstition Vistas parcel.

Jim Holway

Sustaining local communities will require mechanisms to envision and plan for the future and to engage residents in the process. Scenario planning is an increasingly effective way to address these efforts, and Western Lands and Communities, the Lincoln Institute of Land Policy's joint venture with the Sonoran Institute, is working to advance the necessary tools.

Scenario Planning to Address Uncertainty

Land use decisions and planning efforts are critical as communities look 20 to 50 years into the future to guide policy choices and public investments that are sustainable across economic, social, and environmental dimensions. As uncertainty increases and available resources decrease, it becomes ever more important to consider the full range of emerging conditions and to strive to ensure our ability to respond to those changes, adopt policies, and pursue investments that will be resilient across a variety of potential futures.

Key areas of uncertainty include population and demographic changes, economic trends, climatic variability and change, resource costs and availability, land markets, housing preferences, housing affordability, and the fiscal health of local governments. Simultaneous with increasing uncertainty and decreasing resources, or perhaps in part because of them, decision makers face conflicting perspectives on desired futures and on the role of government in providing services and infrastructure as well as regulation and planning.

Increased polarization means that more civic engagement and an informed and supportive public are needed to ensure stable policies and adequate investments in a community's future. Scenario planning offers a mechanism to address these needs and issues of potential uncertainty and conflict. Fortunately, as the scope and complexity of planning and the demand for broader engagement have increased, advances in computing power and public access to technology are making new and more powerful tools available.

The Lincoln Institute has a long history of supporting the development of planning tools and publishing the results (Hopkins and Zapata 2007; Campoli and MacLean 2007; Brail 2008; Kwartler and Longo 2008; Condon, Cavens, and Miller 2009). This article covers lessons learned from

the use of scenario planning tools in several projects undertaken by Western Lands and Communities (WLC), as well as mechanisms to expand their application.

Superstition Vistas

Superstition Vistas is a 275-square-mile expanse of vacant state-owned trust land on the urbanizing edge of the Phoenix metropolitan area (figure 1). State trust lands such as this site in Arizona are key to future growth patterns because the state owns 60 percent of the available land in the path of development. Colorado and New Mexico to a lesser degree face similar opportunities with their state trust lands (Culp, Laurenzi, and Tuell 2006). Creative thinking about the future of Superstition Vistas began to gain momentum in 2003, and the Lincoln Institute, through the WLC joint venture, was an early proponent of these efforts (Propst 2008).

FIGURE 1
The Superstition Vistas Site near Phoenix, Arizona

Source: Fregonese Associates.

Initial WLC objectives for Superstition Vistas scenario planning included capacity building, tool development, and opportunities to catalyze a planning process. More specifically, we sought to:

- look at the land in a bold, holistic, and comprehensive manner;
- advance the Arizona State Land Department's capacity to conduct large-scale planning and establish an example for other state land agencies facing urban growth opportunities;
- design a model sustainable development;
- advance scenario planning tools and illustrate their use;
- catalyze and inform debates about modernizing state trust land planning and development management; and
- stimulate a larger discussion about the Arizona Sun Corridor megaregion.

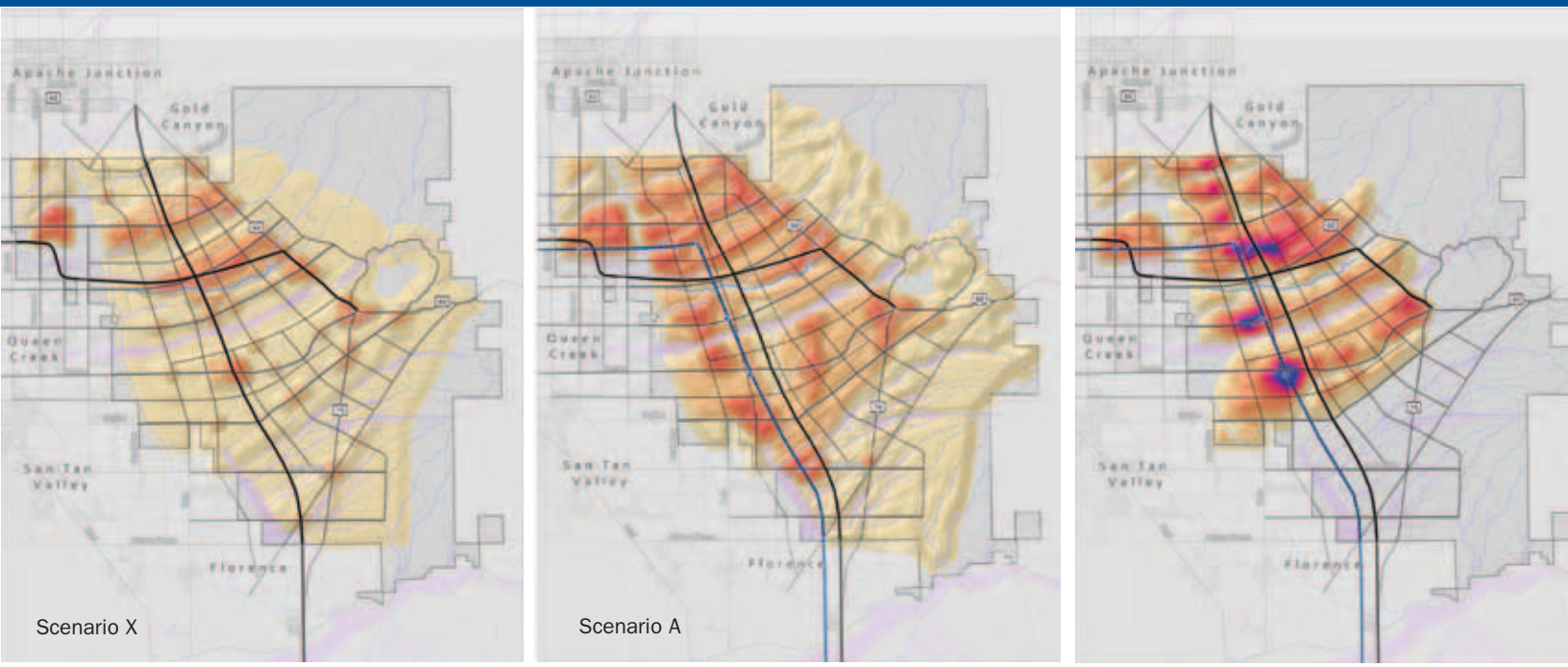
WLC, along with regional partnerships, neighboring jurisdictions, the regional electric and water utility, two private hospital providers, and a local mining company, formed the Superstition Vistas (SV) Steering Committee to advance the planning effort, secure funding, and hire a consulting team. The consultants, working with the committee over a three-year period, conducted extensive public outreach and values research, assembled data on Superstition Vistas, developed and refined a series of alternative land use scenarios for the development of a community of 1 million residents, evaluated the impacts of the different scenarios, and produced a composite scenario for the site.

The Arizona State Land Department (the landowner) adapted the consultants' work to prepare a draft conceptual plan for Superstition Vistas in May 2011 and submitted a proposed comprehensive plan amendment to Pinal County. The county is now considering the proposed amendment and its Board of Supervisors is expected to act in late 2011.

Sustainability Lessons

The scenario analysis, utilizing enhancements supported by WLC, identified the most important factors in shaping development patterns and potential conflicts among desired outcomes (figure 2). The inclusion of individual building and infrastructure costs for the alternative scenarios facilitated examining the sensitivity of varying these key factors and the cost effectiveness of four increasing

FIGURE 2
Three Possible Scenarios for the Development of Superstition Vistas



Study Area
Existing Road
Creeks and Washes
Central Arizona Project
100 Year Floodplain

Proposed Network
Rail Stop
Regional Rail
Freeway
Arizona Parkway
Major Road

Density
Low
Medium
High

Three of the six scenarios produced by the Superstition Vistas consultants illustrate the range of development intensity and developed area. Scenario X is the base case with no comprehensive planning. Scenario A has a minor density increase over current trends in other parts of the region. Scenario D focuses on high-density urban centers.

Source: Superstition Vistas Consulting Team (2011).

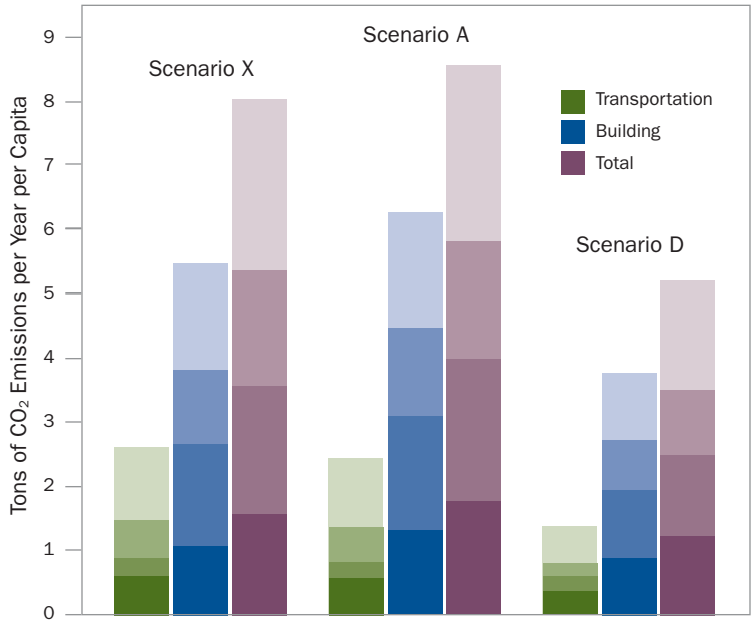
levels of energy and water efficiency in each building type.

The scenarios also examined the impact of urban form on vehicle miles traveled (VMT). Scenario model outputs included land use indicators, energy and water use, VMT, carbon emissions, and construction costs. This analysis revealed the "low-hanging fruit" for sustainability improvements. The consulting team, working with the Steering Committee, identified a number of lessons that illustrate the value of scenario planning tools and can be applied to other efforts to design more sustainable and efficient urban areas (Superstition Vistas Consulting Team 2011).

1. Create mixed-use centers to reduce travel times, energy use, and the carbon footprint. Mixed-use centers along public transportation routes and close to homes and neighborhoods are one of the most effective ways to reduce travel times, energy use, and the resulting carbon footprint. Smaller homes, more compact forms of urban development, and multimodal transportation systems all create similar benefits (figure 3). However, the scenario modeling for Superstition Vistas demonstrated that mixed-use centers would be substantially more important than increased density in affecting transportation choices, energy use, and the carbon footprint.

2. Foster upfront investments and high-quality jobs to catalyze economic success. A strong local economy and a diverse balance of nearby jobs, housing, and shops are critical for a sustainable community, especially when high-quality jobs are provided at the beginning of development. Significant upfront public investment and public-private partnerships can supply critical infrastructure and have an enormous impact on shaping development and increasing the value of state trust land. State owned trust land could also provide unique opportunities for patient capital, with enhanced trust land management authorities providing access to resources for upfront capital investment and the ability to recapture these investments when the land is sold or leased later at a higher value.

FIGURE 3
Carbon Footprint of Transportation and Building Emissions



Baseline	2.59	5.47	8.06	2.38	6.28	8.66	1.39	3.82	5.21
Good	1.50	3.84	5.34	1.38	4.45	5.83	0.80	2,71	3.51
Better	0.95	2.65	3.61	0.87	3.13	4.00	0.51	1.98	2.49
Best	0.58	1.04	1.63	0.54	1.32	1.85	0.31	0.93	1.25

Source: Fregonese Associates.

Transportation fuel and building energy use (baseline, with good, better, and best improvements) impact carbon emissions differently in three of six Superstition Vistas scenarios.

3. Provide multimodal transportation infrastructure and regional connections to facilitate efficient growth. Another critical step is determining how to phase transportation improvements as the region grows and the market can support increased services. Phased components may include buses first, then Bus Rapid Transit (BRT), with rights-of-way set aside for eventual commuter or light-rail corridors. Identifying and building multimodal transportation corridors and infrastructure prior to sales for residential and commercial development should establish the cohesiveness of the entire area and enable the evolution to more capital-intensive transportation infrastructure as the community matures.

4. Design efficient buildings that save water and energy resources and reduce the community's carbon footprint. Incorporating construction costs and return on investment (ROI) data in resource planning allows for financial feasibility and cost-benefit calculations. The consulting team modeled four levels of water and energy use (baseline, good, better, best) for each scenario and building type. Results demonstrated that investments in energy efficiency would be better spent on residential than commercial and industrial buildings. An additional finding showed that building centralized renewable power generation may be a better investment than extreme conservation.

5. Offer housing choices that meet the needs of a diverse population. Ensuring a viable community means meeting the needs of all potential residents with a broad variety of development types and prices that local workers can afford and that allow for adjustments under future market conditions.

6. Incorporate flexibility to respond to changing circumstances. A challenge for large-scale master plans that will take shape in multiple phases over 50 years or more is how to plan so the development itself can evolve and even redevelop over time. Plan implementation needs to include mechanisms to limit future NIMBY (not in my back yard) problems for necessary infill and redevelopment projects.

Procedural Lessons

The visioning process for Superstition Vistas involved planning a completely new city or region of communities in a vacant area with a single public landowner and no existing population. Given the recent economic downturn, as well as the limited capacity of the state agency to bring land to market, development of this area will likely be postponed for a number of years. Despite these particular conditions, procedural lessons learned in the project to date are relevant to other long-term and large-scale efforts, and to the expanded use of scenario planning for community decision making in general.

Agreed-upon procedures and planning processes become increasingly important as the planning and development time period grows and the number of stakeholders increases. Significant changes in participants, perspectives, and external factors, such as the recent collapse of the development economy, should be expected in any long-term, multiparty project. Such challenges need to be considered and incorporated into project tasks.

1. Design for change. Long-term projects need to accommodate changes in stakeholders, decision makers, and even political perspectives during the course of planning and implementation. Projects would benefit enormously from anticipating such changes, agreeing on mechanisms to transfer knowledge to new participants, establishing certain criteria and decisions that new stakeholders would be expected to follow, understanding how to deal with political or market conditions that will

change, and building resiliency for such factors into the alternative scenarios themselves.

2. Consider governance. This is an issue for planning and implementation efforts and for the political decision-making structure of a new community. In building a new city it is important to consider how to create a governance system capable of implementing a consistent, comprehensive vision for a community that does not yet exist.

3. Incorporate new community designs into local and regional comprehensive plans. It is also critical to consider how a project at the scale of Superstition Vistas, with up to 1 million residents and a buildout plan of 50 years or more, can be incorporated into the framework of a typical county comprehensive plan. Scenarios and visions must reflect ideas and plans that local jurisdictions will be politically willing and administratively able to incorporate into their planning processes.

4. Phase development. Communities need to establish mechanisms that allow the adoption of a long-term buildout vision and then incorporate a series of flexible and adaptable phased plans to implement that vision in appropriate stages.

5. Plan for market changes. Market conditions, housing preferences, and employment opportunities will evolve, and large-scale projects with creative and compelling visions may even create their own demand. No one knows what future markets may offer, so consideration of alternative markets and adaptable community designs are critical. Projected housing mixes and estimates of development absorption need to be flexible and not based only on current preferences and trends.

6. Connect to common values. Demonstrating how development proposals connect to common visions and values that are shared and stable over time is also important. For Superstition Vistas, values such as an opportunity for healthy lifestyles and choices for residents across the socioeconomic spectrum were found to be broadly accepted. Planners also need to recognize values that are more controversial or may be transient and likely to change.

Challenges and Opportunities

The WLC experience in planning for Superstition Vistas has been successful in several respects. The community came together through the Steering Committee to develop a consensus vision that represented multijurisdictional cooperation around sustainable "smart" growth. Neighboring communities, at the request of the state land commissioner, deferred any consideration of annexation. In addition, the Arizona State Land Department developed a plan for a geographic scale, time horizon, and level of comprehensiveness well beyond anything attempted previously. However, the proposed comprehensive plan amendment for Superstition Vistas is at best a first step toward a vision for a community of up to 1 million people.

The Arizona State Land Department has been unable, at least so far, to push the envelope very far on new and more creative ways to conceptualize large-scale developments that could enhance the economic value of state trust lands and improve regional urban form. The recent collapse of land and housing markets throughout the country has also impacted this project and local perceptions of future growth potential. Since the overall effort to conceptualize and implement development plans for Superstition Vistas is just beginning, initial on-the-ground development is not expected for at least a decade. There will be multiple opportunities to build on these planning efforts to bring bolder and more comprehensive visions forward as the real estate economy recovers and the land becomes ripe for development.

Scenario planning and effective visualizations become both more important and more challenging to achieve when conducting larger and longer-term visioning exercises. Visualizations that provide compelling depictions of activity centers and higher-density, mixed-use neighborhoods can help to gain public acceptance. Effective mechanisms are also needed to convey to current participants that the planning process is imagining community characteristics and housing and lifestyle preferences for their grandchildren or great-grandchildren many years in the future.

As noted earlier, upfront investments in transportation, economic development, education, and utility services can significantly shape a community, serve as a catalyst for higher-level employment, and earn high returns. To achieve this potential, mechanisms are needed to facilitate these investments, whether on private lands or state trust lands. Continued work on the contributory value of land conservation, infrastructure investment, planning, and ecosystem services, as well as the integration of this information into scenario planning, would greatly aid efforts to address uncertainty and advance community sustainability.

FIGURE 4
Alternative Visions for Downtown Rifle, Colorado

Figure 4a shows the current condition of a site in downtown Rifle, Colorado. Figures 4b and 4c are computer-generated visualizations of redevelopment options for that site.

Source: Fregonese Associates.

Other Projects and Lessons Learned

WLC conducted three additional demonstration projects to further enhance scenario planning tools and apply them in different situations.

Gallatin County, Montana

Sonoran Institute staff worked with Montana State University (MSU) to engage local stakeholders in a workshop where each of four teams produced scenarios for concentrating projected growth within the currently developed "triangle" region of Bozeman, Belgrade, and Four Corners. This effort successfully integrated Envision Tomorrow scenario planning with housing unit projections from the Sonoran Institute's Growth Model and demonstrated the value of ROI tools as a reality check on proposed land use and building types. The project also demonstrated the value of scenario planning to local experts.

Lessons learned include recognizing that (1) for many participants working with paper maps was more intuitive that the touch screen technology we had employed; (2) additional information on land characteristics, such as soil productivity and habitat values, should be used in preparing growth scenarios; and (3) more effective techniques are needed to visualize the density and design of different land use types, as well as to incorporate political and market realities that are not typically captured with scenario planning tools.

Products from this Montana project will include the creation of a library of regionally appropriate building types for use with ROI and scenario modeling and a report examining the costs and benefits, including sustainability impacts, of directing future growth to the triangle area of Gallatin Valley. With WLC support MSU has been able to incorporate the use of scenario planning tools in its graduate program.

Garfield County, Colorado

Sonoran Institute's Western Colorado Legacy Area office, with support from the Lincoln Institute, U.S. Environmental Protection Agency, and other local contributors, utilized the Envision Tomorrow tool in a new way to advance implementation of previously adopted plans calling for mixed-use infill and redevelopment in target growth areas. This project focused on stakeholder education regarding the mechanisms necessary to implement recently adopted comprehensive plans calling for

town-centered development, rather than on scenario generation for a comprehensive plan.

Examination of policy and market feasibility for redevelopment in downtown Rifle, Colorado, was one of three separate efforts undertaken. The City of Rifle project successfully utilized an ROI tool to identify financial and regulatory factors that could impact revitalization efforts and engaged the key parties necessary for implementation, including property owners, developers, realtors, planning commissioners, local officials, state transportation representatives, and local staff.

Among the lessons learned from this project was the importance of grounding bold visions with market reality. For example, previous planning efforts in Rifle had focused on six-to-eight-story mixed-use buildings, but in the current market even three-to-four-story projects are not considered feasible (figure 4c). Most attention now is given to two-story mixed-use projects and townhomes. Visualizations for an underutilized parcel in the center of town illustrated the type of one-story option that may be most feasible for initial commercial development (figure 4b). Constraints related to parking requirements and high minimum lot coverage requirements were also identified as limits on investment. In addition to pinpointing changes in Rifle's building code, these findings spurred discussion about the role of public-private partnerships in catalyzing downtown development.

Morongo Basin, California

This area of high open space and wildlife habitat values between Joshua Tree National Park and the Marine Corps Air Ground Combat Center in Southern California may be impacted by spillover from regional growth. This project with the Morongo Basin Open Space Group involves an innovative effort to link results from the ongoing conservation priority-setting efforts with both a GIS tool to analyze and predict how land use patterns impact wildlife habitat and the scenario planning capability of Envision Tomorrow.

We are evaluating the environmental impacts of the current and potential alternative development patterns and location-specific planning and land use options. The tools being developed for this effort will be useful to land trusts throughout the country that are interested in engaging partners on local and regional planning issues and incorporating larger landscape conservation and wildlife habitat goals into their projects.

Open Source Planning Tools

Western Lands and Communities has recently been focusing on efforts to develop open source planning tools as a mechanism to increase the use of scenario planning. Key factors that hinder their use include: (1) the cost and complexity of the tools themselves; (2) the cost and availability of data; (3) a lack of standardization, making integration of tools and data difficult; and (4) proprietary tools that may be difficult to adapt to local conditions and may impede innovation.

Proponents of open source modeling tools believe open and standardized coding will facilitate increased transparency and interoperability between models, ultimately resulting in faster innovation and greater utilization. As a result of our work with Envision Tomorrow on the Superstition Vistas project, WLC and other members of an open source planning tools group are continuing to advance scenario planning tools and pursue the promise of open source tools that can foster sustainable communities in many more locations.

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