

S U S T A I N
a B I L I T Y

FOR arizona
THE ISSUE OF our age



MORRISON INSTITUTE
FOR PUBLIC POLICY
ARIZONA STATE UNIVERSITY

GLOBAL INSTITUTE
of SUSTAINABILITY
ARIZONA STATE UNIVERSITY

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S U S T A I N

FROM THE PUBLISHER

Sustainability has been called the “biggest story in the history of humanity” by Thomas Lovejoy of the Heinz Center, and it certainly seems to be true in light of recent coverage. For Arizona and across the country, sustainability is not just a topic of discussion, but the focus of new initiatives by businesses, neighborhoods, public agencies, and universities. *The New York Times* columnist Thomas Friedman even went so far as to say 2006 was the tipping point for mainstream acceptance of living and working “green.”

Yet, sustainability is about much more than just being green. It requires making policy choices that take the economy, society, and the environment into account. This inclusiveness and complexity prompted Morrison Institute for Public Policy and its Board of Advisors to choose sustainability as the subject of the 6th edition of Arizona Policy Choices, a series created by the Institute especially to provide new insights on critical issues.

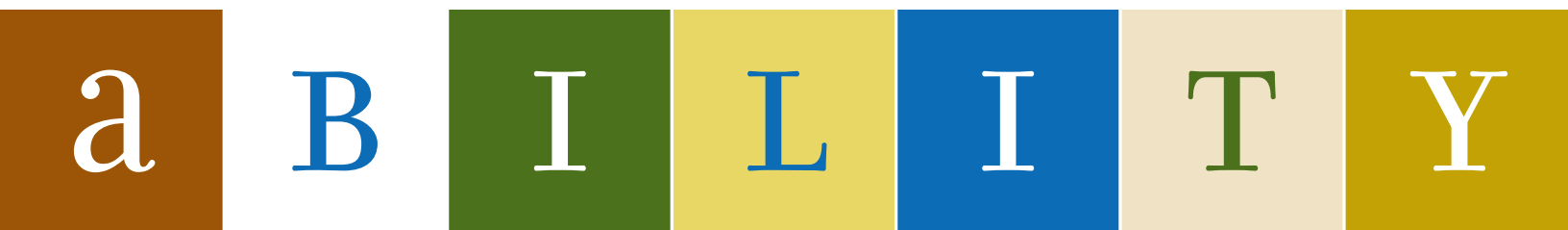
The result is *Sustainability for Arizona: The Issue of Our Age*, a primer on sustainability containing the research of Morrison Institute policy analysts and a wealth of contributed essays from 28 Arizona and national policy thinkers. Not only does this report describe sustainability, but we are also pleased that it has been produced using certified sustainability practices thanks to our partnership with Prisma Graphic and their paper supplier, Stora Enso.

I hope you will read *Sustainability for Arizona: The Issue of Our Age* and share your thoughts with others. By talking and working together, we can develop wise public policies for a better, more sustainable Arizona.



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sustainability For arizona

THE ISSUE OF OUR age

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FOREWORD

Julie Ann Wrigley, President and Chief Executive Officer
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The dawn of an “urban century” and the effects of climate change are just two of the global circumstances that are combining to make sustainability the defining quest of the 21st century. Sustainability, as a result, is larger than one person, one company, or one country. Its scope, scale, and importance mean that traditional approaches to environmental protection and other complex problems will be insufficient to deliver a sustainable world. Never has it been more important to push the envelope to find new ways to manage growth.

For those who are set on inventing the future rather than simply watching it unfold, sustainability demands investment in innovative thinking, research, and programs with expectations of practical solutions and swift, substantial returns.

Sustainability also represents the century’s greatest opportunity. It brings together those concerned with the environment, the economy, and society on equal terms. Most important, sustainability acknowledges the influence of people’s choices on the environment and accepts human behavior as integral to any solution.

Despite today’s growing interest in sustainability, effective efforts to communicate what sustainability means and the urgency to establish policies, measurements, and training to pursue it are still in their infancy. Sustainability, in fact, remains a mysterious buzzword for many policymakers and portions of the public. While leaders and residents often share concerns about their places, they still wonder: “What does sustainability mean here?” Nevertheless, awareness and commitment are expanding rapidly in Arizona and around the world.

Arizona has the opportunity – many would say the responsibility because of our substantial growth, arid climate, and research capacity – to provide a significant “laboratory” for sustainability practices. As our state focuses on understanding sustainability and creating quality and balance, Arizona can become a model for the world.

The success of business people, philanthropists, scientists, and activists in expanding sustainability from a technical topic dear to a handful of insiders to a widely accepted blueprint for public policies at every level will determine whether the 21st century is one of rebirth and expanding quality of life, or a disaster for people and nature alike. The stakes are too high not to embrace this burgeoning field and take the actions – even the risks – that offer possibilities for real changes and dramatic breakthroughs. Our return on investment for these dollars and energies will come when we find the balance that benefits the environment, business, and communities together.

This report, *Sustainability for Arizona: The Issue of Our Age*, offers a valuable service to leaders and individuals, whether they are new to sustainability or already experts in sustainable development. It can help people understand and explain how the principles of sustainability may be put into practice anywhere.



SUSTAINABILITY FOR arizona

THE ISSUE OF OUR AGE

CONTENTS

FROM THE PUBLISHER	2
FOREWORD	5
PART 1 – DEFINING SUSTAINABILITY	9
SUSTAINABILITY: THE ISSUE OF OUR AGE	10
LESSONS ON SUSTAINABILITY FROM ARIZONA’S PAST	14
PART 2 – QUESTIONS LEADERS ARE ASKING ABOUT SUSTAINABILITY	19
IS ARIZONA SUSTAINABLE NOW?	20
CAN A SUSTAINABLE ECONOMY BE A COMPETITIVE ECONOMY?	24
DOES SUSTAINABILITY MEAN BRIDGING THE GAP BETWEEN THE “HAVES” AND THE “HAVE NOTS”?	28
WILL INACTION AND GROWTH STYMIE SUSTAINABILITY AND ENVIRONMENTAL EFFORTS?	32
HOW CAN ARIZONA KEEP SCORE ON SUSTAINABILITY?	37
PART 3 – LEADING THINKERS SPEAK OUT ON SUSTAINABILITY	41
IMPROVING PRACTICES FOR SUSTAINABILITY	42
Sustaining Resources Makes Good Business Sense	42
Arizona Ranches Plan to Protect Land and Adapt to a Changing Economy	43
Green Building: Could Home Builders Be Missing the Boat?	44
Historic Federal Water Plan Concentrated Urban Settlement and Protected Open Space in Arizona.	45
New Degree Program Will Educate a Sustainability Workforce	46
Using Local Foods Is Key to Sustainability	47
LEVERAGING ASSETS FOR SUSTAINABILITY	48
Schools Can Capitalize on the “Disadvantages of Success” for the Next Generation of Workers	48
Arizona Can Be Sustainability’s Test Bed	49
Phoenix Quality of Life and Amenities Make Sustainability Achievable.	50
Eco-Industrial Park Will Position Coconino County as a Sustainability Center.	51
Sense of Place Provides Long-Term Economic Asset for Rural Communities	52
At Its Best, Agriculture Serves the Economy, Communities, and Security	53
DEFINING NEEDS FOR SUSTAINABILITY	54
Education, Health, and Research Are Three Investment Imperatives for a Sustainable Arizona	54



Public Health Investments in Prevention Are Needed to Balance Forces of the Marketplace.	55
Six Challenges Must Be Met for a Sustainable Water Supply	56
Water Regulation Should Serve Arizona's Waterways and Riparian Areas.	57
Arizona Should Preserve Agriculture as Our Heritage and Water Hedge	58
Green Olympics Would Motivate Cleaner, Cheaper, Safer Designs.	59
MAKING DECISIONS FOR SUSTAINABILITY	60
Sustainability Thinking Starts at Home	60
Carrying Capacity Must Be Addressed Before People Vote with Their Feet.	61
Sustainability's Elusive Balance Must Be Part of Every Policy Decision.	62
Take Uncertainty Seriously and Learn from Experience	63
Attaining Sustainability Requires a Scorecard	64
Consumption and Personal Gratification Must Be Redirected Toward Conservation and Community	65
PART 4 – SUSTAINABILITY AT WORK: EXAMPLES OF PUBLIC, PRIVATE, AND PUBLIC-PRIVATE PARTNERSHIP INITIATIVES	67
WHERE INGENUITY MEETS OPPORTUNITY AND NECESSITY	68
Public Initiatives	68
Private Initiatives	70
Public-Private Partnerships	73
PART 5 – ARIZONA'S SUSTAINABLE FUTURE	77
SUSTAINABILITY: A NEW ORGANIZING PRINCIPLE	78
SELECTED RESOURCES AND REFERENCES	82



THE ARIZONA POLICY CHOICES SERIES

- Sustainability for Arizona: The Issue of Our Age – 2007
- How Arizona Compares: Real Numbers and Hot Topics – 2005
- Five Shoes Waiting to Drop on Arizona's Future – 2001
- The New Economy: A Guide for Arizona – 1999
- Growth in Arizona: The Machine in the Garden – 1998
- Balancing Acts: Tax Cuts and Public Policy in Arizona – 1997

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DEFINING SUSTAINABILITY

Sustainability is a condition of existence which enables the present generation of humans and other species to enjoy social wellbeing, a vibrant economy, and a healthy environment, and to experience fulfillment, beauty, and joy, without compromising the ability of future generations of humans and other species to enjoy the same.

Guy Dauncey, President, British Columbia Sustainable Energy Association;
Consultant to Civano Development, Tucson

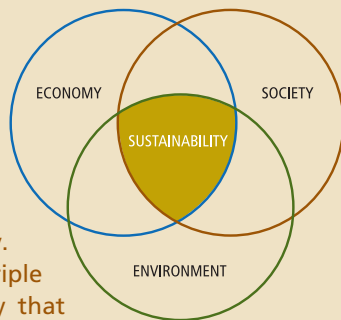
SUSTAINABILITY: THE ISSUE OF OUR AGE

The American West, for many, has been about becoming, not being; about betting on the future with little regard for constraints; about exploiting a place for short-term gains. Arizona, for its part, has traditionally embodied the type of place people move to for an opportunity, not necessarily to stay. That would make Arizona seem an unlikely state to be concerned about sustainability. Yet in discussions of almost every public policy issue, few other words are used as often, with as much fervor, or with as many meanings as sustainability.

Today, “Arizona” and “sustainability” represent a place and a concept poised together at the brink of humankind’s most urgent need. This shift marks a dramatic point in the state’s history. From the beginning of Euro-American settlement, Arizonans have focused their attention on state building in a forbidding place. Raising Arizona was the challenge of the 20th century. Sustaining Arizona is now the challenge of the 21st.

SUSTAINABILITY INVOLVES MULTIPLE COMPONENTS

Many people are familiar with the three overlapping circles used to represent sustainability. One circle stands for economic performance, another for social equity, and another for environmental quality. Together they comprise the triple bottom line of sustainability that business and policy leaders must address with every decision they make. Where the interests of all three circles intersect is considered the “sweet spot” of sustainability, the place where progress on all three fronts can be achieved.



As leaders learn to apply the triple bottom line approach to sustainability, some have started to consider additional circles. A fourth circle, for example, might represent new technology, since innovation must play a role in finding answers to issues such as energy production and air pollution. A fifth circle could represent culture, which binds society together yet exists apart from the concept of social equity. Some observers also suggest the environment circle should be expanded to encompass all others, arguing that environment is the foundation upon which everything else depends.

Turning sustainability’s broad tenets into workable policies is a multi-faceted puzzle. As internationally respected scientist Mostafa Tolba, chairman of the United Nations Commission on Sustainable Development, has written: “Achieving sustainable development is perhaps one of the most difficult and one of the most pressing goals we face. It requires on the part of all of us commitment, action, partnerships and, sometimes, sacrifices of our traditional life patterns and personal interests.”

Many of the challenges of sustainability are those that policy-makers have struggled with for decades. Environmental quality, family well-being, economic development, and smart growth have been covered in countless publications, including prior editions of Arizona Policy Choices. Sustainability, however, approaches the issues from a different perspective. Better described as a journey than a destination, sustainability draws on knowledge from many disciplines and accepts people as part of – and decision makers in – the environment. It looks for integrated solutions that serve the economy, environment, and society simultaneously. It acknowledges the part that values play in choices and everyone’s responsibility for a quality future.

Sustainability reflects both a monumental concept of life on a global scale and a simple notion of balance applicable to

everyone. The most commonly used “official” definition comes from the 1987 United Nations’ landmark report *Our Common Future*, where it was defined as “meeting the needs of present generations, while not compromising the ability of future generations to meet their own needs.” Increasingly, governments, businesses, and organizations everywhere are putting sustainability into practice as:

- An overarching value that requires best practices at every level of organization
- A framework for evaluating policies that will advance strong economies, healthy environments, and equitable opportunities
- A fresh organizing principle for local, state, and national programs
- A mantra requiring everyone to take responsibility for a quality future

Sustainability, however, is not a new idea. Many American Indian tribes long considered decisions in light of their effects on the seventh generation. Gifford Pinchot, the first chief of the U.S. Forest Service, is well known for describing conservation as “the greatest good for the greatest number for the longest time.” In turn, many public policy analysts have called for systems thinking, integration, and holistic solutions to recognize complex connections among difficult issues.

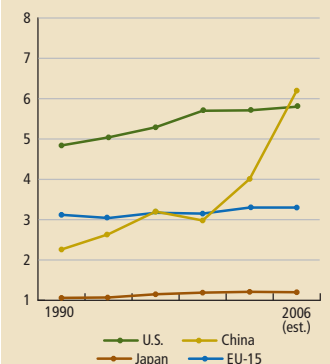
The untoward effects of global development, dramatic population growth, climate change, and widening gaps between the “haves” and “have nots” have sounded sustainability alarms. Many public and private sector leaders have concluded that business as usual threatens not just quality of life, but life in total. At the same time, executives with a wide range of businesses and organizations are realizing that doing good and doing well can be mutually reinforcing over the long term, not mutually exclusive. Thus, while sustainability has developed in response to threats, it has also grown because of the desire to find new ways to solve old problems.

Today’s concern for sustainability has roots in many places. Publications such as The Club of Rome’s 1972 report, *The Limits to Growth*, and reports from international blue ribbon

Governments, businesses, organizations, and individuals everywhere are putting sustainability front and center as:

- An overarching value
- A policy framework
- A planning model
- A mantra

CHINA RECENTLY PASSED THE U.S. IN CO₂ EMISSIONS FROM FOSSIL FUELS (IN 1,000 MEGATONS)



Source: Morrison Institute for Public Policy, ASU; data from Netherlands Environmental Assessment Agency, 2007.

DON'T EAT YOUR SEED CORN

What is “sustainability?” It boils down to this: Don’t eat your seed corn. A time-tested concept, sustainability highlights the need to build replenishing systems that can supply the present without compromising the future. Sustainability is about people: How to foster a robust workforce and strong communities. Sustainability addresses innovation: How to spark it, nurture it, and protect it so the idea pipelines don’t run dry. Sustainability can be a lens to focus on values: Inspired by faith, family, personal commitment...on the built environment and on markets. And, of course, sustainability is also about natural resources: How to use, renew, and account for environmental capital.



Marketplace, American Public Media, <http://americanpublicmedia.publicradio.org/sustainability>

DEFINITION OF SUSTAINABLE DEVELOPMENT

WHAT IS TO BE SUSTAINED

NATURE

Earth
Biodiversity
Ecosystems

LIFE SUPPORT

Ecosystem Services
Resources
Environment

COMMUNITY

Earth
Biodiversity
Ecosystems

WHAT IS TO BE DEVELOPED

PEOPLE

Child Survival
Life Expectancy
Education
Equity
Equal Opportunity

ECONOMY

Wealth
Productive Sectors
Consumption

SOCIETY

Institutions
Social Capital
States
Regions

Source: U.S. National Research Council.

commissions have often linked the great issues of peace, freedom, development, and the environment. For example, *Environment* magazine summarized the United Nations report, *Our Common Future*, as follows:

- Human needs are basic and essential; economic growth – but also equity to share resources with the poor – is required to sustain them; and equity is encouraged by effective citizen participation.
- Environment is where we live; and development is what we all do in attempting to improve our lot within that abode. The two are inseparable.
- The concept of sustainable development does imply limits – not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities.

In 1999, the U.S. National Academy of Sciences published its report on the topic, *Our Common Journey: A Transition Toward Sustainability*. This report observed that sustainable development is “now central to the mission of countless international organizations, national institutions, corporate enterprises, ‘sustainable cities,’ and states.” It also focused on defining issues:

- What is to be sustained? The answer: Nature, Life Support, and Community.
- What is to be developed? The answer: People, Economy, and Society.

More recently, the Intergovernmental Panel on Climate Change (IPCC) – an eminent scientific group established by governments around the world to assess evidence on global warming – highlighted the urgency of instituting sustainable practices in a series of summary reports released in 2007. The IPCC reports concluded with high confidence that human-related activities, particularly burning of fossil fuels and agriculture, had precipitously increased the concentration of carbon dioxide and other greenhouse gases to unprecedented levels, leading to a rise in global temperatures. The probable result, according to IPCC scientists, will be widespread climate warming that will likely trigger extreme weather patterns, disastrous sea level rises, loss of arable land, increased fire risk, and other negative environmental, economic, and social effects that could persist for centuries. Current policies to address the issue, according to IPCC reports, are not sufficient to slow the trend. New policies and actions are needed.

While many nations and industries are not yet vigorously addressing sustainability issues, the goal has been embraced by some unexpected players. *Fortune* magazine noted that Wal-Mart, the world’s largest retailer, has decided to transition itself into the world’s largest sustainable company and, in so doing, anticipates cutting fossil fuel consumption and becoming the dominant marketer of organic milk and cotton. Wal-Mart also wants its suppliers to reduce packaging and energy use, which could magnify the effects of its sustainability mission enormously. At the same time, production home builders in the U.S. have brought “zero energy” subdivisions to the marketplace, particularly in California, and manufacturers of everything from old-line household products to cutting-edge technologies have taken up source reduction, recycling, and renewable materials.

SOURCE REDUCTION IS TO GARBAGE WHAT PREVENTIVE MEDICINE IS TO HEALTH.

William L. Rathje, Professor Emeritus
and Founder of The University of Arizona's
Garbage Project

Still, the journey toward sustainability is full of barriers. Interest groups each have their own jargon, stakeholders, and experts, and most sustainability enthusiasts start from a narrow discipline that shapes their outlooks on solutions. While everyone may want to sing the same song, it takes time to learn the music.

As a result, sustainability may best be addressed at the local and state levels. Michael Willis, 2006 president of International City/County Managers Association (ICMA), wrote in *Public Management*, “The answers to the issues of our age do not come solely from the global political arena but also from the very things we do at the local level. For nowhere is change more achievable than at the individual and local levels. In so many ways, it’s the things we do locally that really count.” True, states and metropolitan regions by themselves cannot easily measure their impacts on global conditions. What they can do, however, is monitor their progress toward balance as a proxy for contributions to world sustainability.

At the state and local levels, sustainability can be viewed simply as the “right” or “wrong” trajectory toward specific goals. Based on measurable indicators, states, counties, and cities must:

- Maintain policies and actions that take it in the right direction
- Change policies and actions that take it in the wrong direction

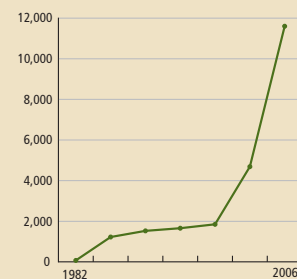
To make progress toward sustainability, communities need to agree on a set of goals and create a dynamic process for making decisions, tracking trajectories, and recognizing balance. They need to identify what is to be measured and monitored so their policies are meaningful for everyone. They need to make sustainability stand for positive actions and accomplishments. Because the stakes are high, the expectations are similarly high.

Tra·Jec·TO·ry

A path, progression, or line of development resembling a physical trajectory
<an upward career trajectory>

Source: www.m-w.com.

WIND GENERATION IN THE U.S. IS ON A RISING TRAJECTORY (IN MW)



Source: Morrison Institute for Public Policy, ASU; data from U.S. Department of Energy Wind Energy Program and American Wind Energy Association.

GOVERNORS SPEAK OUT ON CONSERVATION, 1908

We, the governors of the States and Territories of the United States of America in conference assembled, do hereby declare the conviction that the great prosperity of our country rests upon the abundant resources of the land chosen by our forefathers for their homes, and where they laid the foundation of this great nation.

We look upon these resources as a heritage to be made use of in establishing and promoting the comfort, prosperity, and happiness of the American people, but not to be wasted, deteriorated, or needlessly destroyed...

We agree, in the light of the facts brought to our knowledge and from information received from sources which we cannot doubt, that this material basis is threatened with exhaustion. Even as each succeeding generation from the birth of the nation has performed its part in promoting the progress and development of the Republic, so do we in this generation recognize it as a high duty to perform our part; and this duty in large degree lies in the adoption of measures for the conservation of the natural wealth of the country. [Applause]

We declare our firm conviction that this conservation of our natural resources is a subject of transcendent importance which should engage unremittingly the attention of the nation, the States, and the people in earnest cooperation...

Let us conserve the foundation of our prosperity. [Great applause]

Excerpt of a public declaration from state and territorial governors following the first conference of governors convened by President Theodore Roosevelt in 1908.

LESSONS ON SUSTAINABILITY FROM ARIZONA'S PAST

An ancient land of long habitation but a short modern history, Arizona has been described as part of the Old West, the New West, and the Next West. Now, the time has come for the Sustainable West. Societies have always interacted in complex ways with their economies and environments. No exception, Arizona's history has been full of adaptations to an arid land. The state also has felt the impact of national trends as well as disgraces of its own making. From both the good and the bad experiences, five lessons stand out for sustainability.

HISTORY IS WHO
we are and WHY
we are THE way
we are.

David C. McCullough, Pulitzer Prize-winning Historian and Author

Success can be short-lived, but places can be reborn. Think of Tombstone's silver boom and bust, grasslands ravaged by overgrazing, and the reinvention of copper and railroad towns.

Boom and bust is a phrase inextricably tied to the West. Arizonans most often apply it to mining communities, with Tombstone being one of the best-known cases. Between about 1877 and 1886, Tombstone's approximately 50 mines produced almost \$30 million in silver, and to fuel those operations Tombstone used "enough wood, stacked four feet high in four-foot lengths, to stretch nearly 200 miles" according to anthropologist Thomas Sheridan. But the heyday ended when low silver prices and flooding in the underground mines made extracting the ore impractical. Tombstone's woodcutting economy also died with the mines.

During nearly the same period, large-scale livestock grazing arrived in Arizona – by rail. Cattle growers shipped huge numbers of stock to what seemed like endless acres of grass, particularly in southeastern Arizona. Then drought struck, first in the mid-1880s, and again in the early 1890s. From mining, woodcutting, and grazing, huge swaths of land were left without trees and grass, creating a "moonscape" that remains evident even now.

History also shows that the "busted" can be renewed. Wilderness designations and new grazing practices have helped some southeastern rangeland to heal. Old mining towns, notably Bisbee and Jerome, leveraged their colorful histories and historic buildings to retool as arts and tourism centers. More recently, the railroad and Route 66 town, Winslow, moved toward revitalization with renovation of its La Posada Hotel, the last great Fred Harvey railroad stopover designed by Mary Jane Colter. What is different today, though, is the accelerating pace and breadth of change. If we consume our last reservoirs of natural resources and historic landmarks, how will we renew places in the future?

The powerful and the weak can readily change places. Think of the legislative power shift from rural to urban, the economic impacts of Indian gaming, and the far-reaching effects of American Indian water settlements.

With a single stroke, a balance of power can shift. In 1960, Arizona's population topped 1 million, due to urban growth, yet rural areas still held sway in the legislature. The reason was Arizona's federal model for lawmaking: the House of Representatives was districted by population, but



the Senate was districted by county. Since most counties remained rural, they held disproportionate power. A U.S. Supreme Court decision in 1964, however, changed Arizona's and other states' legislatures forever by requiring "one man one vote." The result was a shift of influence from the country to the cities. Today, more than 80% of Arizonans live in urban areas, a fact reflected in the membership of the modern legislature.

Another U.S. Supreme Court decision in 1993 changed tribal fortunes when it enabled Indian gaming. By 1994, 16 Arizona tribes had negotiated gaming agreements with the state, and 10 casinos were already in operation. Since then, casino dollars have ignited economic development on many reservations. The result is that once-ignored tribes have become prominent players in decisions about Arizona's urban development, and indeed, its entire future.

A third stroke of change occurred with the federal Arizona Water Settlements Act of 2004. As told by George Webb in *A Pima Remembers*, the Pima Indians had farmed along the Gila River for centuries, but saw their way of life altered in the early 20th century when the Gila was dammed upstream. The 2004 settlement reinstated the Pima water rights, giving the Gila River Indian Community, Ak-Chin Indian Community, and Tohono O'odham Nation new resources and importance to municipalities and developers that are trying to assemble water portfolios to meet metropolitan demands.

Benefits on one hand can mean hardships on the other. Think of the unanticipated effects from water projects and the social costs of economic and population expansion.

Many of the West's major reclamation projects were justified by benefits that seemed to outweigh any potential costs because the dams provided hydroelectric power, stable water supplies, flood control, and economic opportunities. Today, however, unintended consequences from these vast waterworks have become apparent. Damming of waterways, for example, has inadvertently destroyed riparian habitats across the state.

The demise of Phoenix's Golden Gate barrio shows how progress can steamroll social and culturally viable communities. Comprised mostly of low-income Mexican Americans and immigrants, Golden Gate in the 1950s stood directly in the path of airport expansion. Ultimately, most Golden Gate families were relocated to the new area of Maryvale so the airport could grow, but the resettlement process sowed mistrust and tension among Latinos starting new lives as well as existing Maryvale residents. While Sky Harbor Airport has since become one of the busiest transportation hubs in the nation, its success was built in part on the involuntary sacrifices of earlier residents.

Arizona's population growth over the past half century has been a blessing as well as a curse. It has brought jobs, economic growth, and expanded cultural opportunities, but also created

MAJOR PHASES IN ARIZONA'S HISTORY

INCORPORATION 6th-19th centuries

Spaniards, Mexicans, and Anglo Americans tried to bring the region and indigenous residents under their control.

EXTRACTION 19th century to World War II

Extractive industries – stock raising, mining, and agriculture – dominated Arizona's economy.

TRANSFORMATION Post World War II to present

"Those seeds of transformation sprouted and flourished during World War II and the postwar boom, when the Southwest became an overwhelming urban society..."

Source: Thomas E. Sheridan, *A History of the Southwest: The Land and Its People*.

strains between newcomers and long-term residents and raised concerns about how to create a sense of community in new places. Growth is also responsible for increasing anxiety about quality of life, water, and air quality.

Staying power requires new thinking and adaptation, not just persistence.
Think of reclamation, long-term goals, and evolving toward balance.

As indigenous farmers proved, water is the essential ingredient to make desert communities bloom. Yet rains and rivers in this harsh climate are fickle. Thus, a stable water supply for Arizona’s biggest cities depended on engineering genius, steady political backing, and deep

pockets over long periods of time. Ironically, Arizona’s two best-known federal water projects – Roosevelt Dam and the Central Arizona Project – marked both the beginning and end of America’s federal commitment to huge investments in water storage and transfer.

Leadership had to adapt. The campaigns that won big federal water projects in the early and mid-20th century are now often characterized as boosterism – an outmoded type of promotion that tended to blindly deny all faults or problems. Today, leaders have taken up the mantra of sustainability as it has become clear that the traditional pattern of putting the economy first cannot continue without increasingly large negative effects. Jobs, housing, population growth, natural resources, transportation, family life, and all the rest must be balanced.

HISTORICAL ARIZONA	EVOLVING ARIZONA
Boosterism	Balance
Few restraints because of few residents	Clear limits because of a large population
Exclusion	Inclusion
"Congratulations, escape, and development" *	Realism and long-term investment
Rural	Urban
External Standings	Internal Trajectories and Sound Comparisons
Leadership only by elites	Contributions from many voices
Growth at all costs	Quality growth
Small scale and scope of population and economic activity	Large population and global economic competition
* Charles S. Peterson, "Speaking for the Past," <i>The Oxford History of the American West</i> . Source: Morrison Institute for Public Policy, ASU, 2007.	

Today, leaders have taken up the mantra of sustainability as it has become clear that the traditional pattern of putting the economy first cannot continue without increasingly large negative effects.

Misguided policies, wrong-headed practices, and clashes of values must be addressed sooner or later. Think of federal intervention, cures for the maladies of “King Real Estate” and car-dependent cities, and individualists versus collectivists.

When state leaders have not been willing to correct public policy mistakes and missteps, change has come anyway – by federal pressure, judicial decisions, and voters’ actions. In 1948, an Arizona Supreme Court decision confirmed the right of American Indians to vote in Arizona elections. In the late 1970s, the U.S. Secretary of the Interior forced Arizona to enact groundwater management laws by threatening to block the Central Arizona Project. Recent court cases ordered equitable K-12 funding and improved services for English language learners. Broad grassroots efforts helped win school integration in Arizona the year before the issue was decided nationally by the U.S. Supreme Court’s decision on *Brown vs. Board of Education*, and also brought Arizona a holiday honoring Martin Luther King, Jr. after boycotts cost the state the 1993 Super Bowl.

To address the downsides of economic dependence on population growth and the negative impacts of car-dependent cities, new policies – albeit first steps – are now being enacted. Some

examples: With support from policymakers, business leaders, and civic groups, voters approved light rail for metropolitan Phoenix, financial support for K-12 education, and more funding for science and technology research at the state’s public universities – all to improve the state’s economic position and quality of life.

At the same time, Arizona owes much to the collaborative efforts of community builders and massive investments from the federal government. While Arizonans are often portrayed as archetypal rugged individualists, historian Richard White notes that Arizona and other states “can more accurately be seen as the child of government and large corporations,” and anthropologist Thomas Sheridan adds: “Behind every rugged individual is a government agency.”

Innovations in public policy have often come when the values of individualism and collectivism had to be balanced. So, if issues must be addressed sooner or later, the question is why not sooner? Can we do a better job of educating our public leaders? These five lessons touch on a few highlights from Arizona’s past. They show the necessity of stewardship, the huge payoff of investments for the future, and the value of a long-term timeframe. Arizona’s past lessons suggest that, for sustainability to occur, the policy watchwords of the future should be resilience, equity, innovation, balance, and reconciliation.

Interpreting Lessons From Arizona’s Past	
Lessons From the Past	Policy Principle for the Future
Success can be short-lived, but places can be reborn.	Resilience
The powerful and the weak can readily change places.	Equity
Benefits on one hand can mean hardship on the other.	Balance
Staying power requires new thinking and adaptation, not just persistence.	Innovation
Misguided policies, wrong-headed practices, and clashes of values must be addressed sooner or later.	Reconciliation
Source: Morrison Institute for Public Policy, ASU, 2007.	

INNOVATIONS IN PUBLIC POLICY HAVE OFTEN COME WHEN THE VALUES OF INDIVIDUALISM AND COLLECTIVISM HAD TO BE BALANCED.

THE NEXT BUSINESS EVOLUTION

Sustainability in business is the natural evolution of the Total Quality Management (TQM) movement. Two decades ago, everyone was talking about TQM – there were conferences, seminars, and awards. But few really knew what it meant. Today a company without a quality management process as part of its core business is not likely to be in operation. Looking at the current craze over sustainability, it feels like TQM all over again – lots of talk, with tremendous uncertainty about what it means and how to do it. But I expect that sustainability, with its longer term view on economics, society and the environment, will also become a norm in business within the next several years. And we will all be better off for the evolution.

Ed Fox, Vice President of Communications, Environment, and Safety for APS





QUESTIONS LEADERS ARE ASKING ABOUT SUSTAINABILITY

If we want to create a society in Arizona that is more than a series of booms and busts, we need to make the fit between nature and culture more like a membrane and less like a life support system. There is too much at stake in this wild, dry land to do otherwise.

Thomas Sheridan, Professor of Anthropology,
The University of Arizona

IS ARIZONA SUSTAINABLE NOW?	20
CAN A SUSTAINABLE ECONOMY BE A COMPETITIVE ECONOMY?	24
DOES SUSTAINABILITY MEAN BRIDGING THE GAP BETWEEN THE "HAVES" AND THE "HAVE NOTS"?	28
WILL INACTION AND GROWTH STYMIE SUSTAINABILITY AND ENVIRONMENTAL EFFORTS?	32
HOW CAN ARIZONA KEEP SCORE ON SUSTAINABILITY?	37

IS ARIZONA SUSTAINABLE NOW?

To get a significant
toehold for a
population base
to live in the desert
took relentless
boosterism by past
generations of
pioneering
entrepreneurs.

Grady Gammage, Jr., Author of
*Phoenix in Perspective: Reflections
on Developing the Desert*

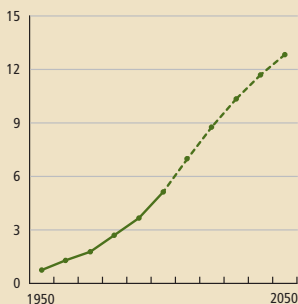
Arizona has a penchant for quick payoffs, a habit of addressing one problem at a time, and a hands-off political culture that, combined, make it easier for leaders to talk around, rather than address, sustainability for the state. Arizona's situation is complicated by the fact that, despite an array of visions, plans, policies, programs, and initiatives, it lacks some of the tools it needs to accurately plot the state's trajectory toward sustainability. All this makes it impossible to definitively answer the question, "Is Arizona sustainable now?" Looking at the state's track record, one cannot help but be skeptical about Arizona's prospects for sustainability. But this is offset somewhat by another traditional Western attribute – faith in the future. Both skepticism and optimism are, in fact, well-founded.

A Tendency to Get Behind the Curve on Significant Issues

Through the years, Arizona's leaders have received numerous warnings about trends and their potential consequences. Sometimes the wake-up calls have been answered; other times they have gone unheeded. Even when action has been taken, it is often insufficient to the task due to population growth, a mismatch between the size of the problem and the size of the investment, or the spin-off effects of national movements. This is not lost on residents. In a 2004 survey, Arizonans compared their state negatively to others on 8 out of 12 items ranging from housing costs to education and financial well-being. Among Arizona's issues:

- **AIR QUALITY** In every decade since the 1960s, Arizona residents have noted their concerns over air quality. A 2006 survey of Arizona households by Behavior Research Center showed that 58% reported one or more family members had "an adverse reaction to stagnant and polluted air" during the last months of 2005. On the same question in 1994, a total of 41% of respondents noted poor reactions to air quality. Back in 1972, the U.S. Environmental Protection Agency first required Arizona to create a plan to show how problem areas would meet the requirements of the 1965 Clean Air Act. And while nearly every county in Arizona has been rated a nonattainment area for one or more of six air quality measures, *The Arizona Republic* noted that Maricopa County has earned the distinction as only the second county in the nation to receive the U.S. Environmental Protection Agency's strictest warning on particulate pollution.
- **HEAT ISLAND EFFECT** As urban areas are built, their new pavement and buildings absorb enough daytime heat to eventually raise nighttime temperatures – a phenomenon known as heat island effect. First taken seriously in metropolitan Phoenix in the early 1990s, heat island effect has become an increasing concern because, according to Arizona State University researchers, its size and intensity will continue to grow. This will lead to additional water and energy use, even in places that today are on the far edges of the metropolis. Experts note that some simple solutions are at hand now, but they need to be adopted on sufficient scale to change the current trend.

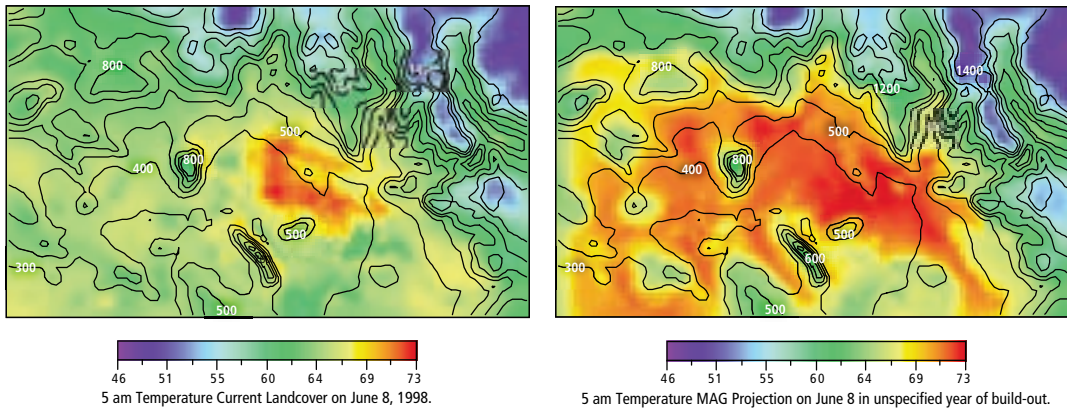
ARIZONA'S FORECAST IS FOR GROWTH (POPULATION IN MILLIONS)



Source: Morrison Institute for Public Policy, ASU; data from Arizona Department of Economic Security, Research Administration, Population Statistics Unit, 2006.

EXPERTS FORECAST INCREASED SUMMER NIGHTTIME TEMPERATURES DUE TO URBANIZATION

(LOW SUMMER TEMPERATURES FOR PHOENIX REGION – ACTUAL COMPARED TO ESTIMATED BUILD-OUT)



Source: Susanne Grossman-Clarke, Ph.D., ASU Global Institute of Sustainability.

- **GROUNDWATER** Despite the state's strong history of innovative water management practices and water-saving technologies, experts warn of trouble ahead. Karen Smith, deputy director of Arizona Department of Water Resources, stated in 2006: "Based on today's rates of water consumption and pumping...we will not reach safe yield in any of the active management areas by 2025." Safe yield means striking a balance between groundwater pumping and recharge and is one of the most important goals set by the state's 1980 Groundwater Management Act. The current situation troubles many state residents. In a 2006 survey commissioned by Valley Forward, more than 6 out of 10 metropolitan Phoenix residents said they believed there is a water crisis in Arizona.
- **EDUCATION** High school drop outs started to make headlines in Arizona after the 1983 report, *A Nation at Risk*, highlighted education problems in the U.S. Since then, Arizona has usually ranked near the bottom of state comparisons for drop outs. Recent examinations of high school graduation rates, however, paint a better picture. In 2004, Arizona showed a 76.8% graduation rate, slightly above average for the country, though well below leading states.

Air quality, water, urban heat island, and graduation levels are just some of the areas where Arizona has shown subpar performance. Major national indices have highlighted other areas in which Arizona also lags. While rankings are often criticized for glossing over individual nuances, Arizona's preponderance of middle and low scores certainly should give everyone pause.

When all the water is gone, the deserts are paved, the temps are even more scorching, and the air is sickening, then we will all learn that we cannot drink, eat, or breathe cars, super freeways, or money. But by then it may be too late to save us. For the sake of all of us and all that is good in the world, I hope it doesn't come to that. We are smart people and we can live cleaner.

Daniel R. Patterson, Tucson Ecologist

NATIONAL RANKINGS SHOW MIXED VIEWS OF ARIZONA'S PERFORMANCE ON SIGNIFICANT ISSUES

REPORT	WHAT IT MEASURES	YEAR	RANK* OR GRADE
State Technology & Science Index	Capacity of a state's science and technology assets	2004	17
CFED Development Report Card	Overall development capacity of states	2007	42
State of the States	Capacity of states to achieve sustainable development	2001	31
Kids Count	Key indicators of child well-being	2006	37
CFED Assets and Opportunities	Overall financial security of families	2007	F
Measuring Up	State performance in higher education	2006	D (Preparation) B (Completion) F (Affordability)
From Cradle to Career	Performance of state educational systems and chance of career success for students	2007	43 (K-12 Achievement) 49 (Chance for Success)

*Rank is usually among 50 states and Washington, D.C.; lower numbers are better.

Sources: Morrison Institute for Public Policy, ASU; data from (in order) Milken Institute, Corporation for Enterprise Development, Renewable Resources Institute, The Annie E. Casey Foundation, Corporation For Enterprise Development, Measuring Up/National Center for Public Policy and Higher Education, Editorial Projects in Education Research Center/ Education Week.

one encouraging aspect of the state is its streak of optimism that great things can be accomplished when appropriate attention and forces are brought to bear.

Reliance on a Growth-for-Growth's-Sake Economy

The University of Arizona economist Marshall Vest may have said it best: "growth industries have been driving growth." Indeed, the construction industry in 2006 accounted for nearly 25% of Arizona's jobs compared to a normal U.S. range of 5% to 7%, according to Vest. This, says Jon Talton, *The Arizona Republic's* former business columnist, gives growth "a giant economic footprint" in Arizona. With more than 1 million new residents between 1990 and 2000, one would reasonably expect the state's housing and construction industries to look strong, but as an economy it can't be sustainable. Says one long-time observer, Tony Davis of the *Arizona Daily Star*, "We're still acting like we need to open up the West and settle the West."

Historically, as long as the number of people and jobs increased, many of Arizona's leaders have considered the state to be doing well. Arizona's dependence on real estate development and the service industry, however, is largely at odds with creation of a globally competitive economy. A population growth-centered economy raises concerns about insufficient economic diversity, lack of innovation, declining quality of life, and a preponderance of low-skilled workers in the labor pool. While growth can sometimes bring an influx of highly educated workers, it can simultaneously undercut efforts to upgrade local education and job training.

Hung Up on Boundaries in a Boundary-less World

When it comes to managing our cities and towns, boundaries are necessary for some functions, but they can complicate long-term regional solutions to cross-jurisdictional issues such as transportation, economic development, business siting, revenue sharing, water planning, and open space protection. Arizona has shown it can display regional thinking on some aspects of transportation and economic development, but intergovernmental competition continues to shape many policies. Regional collaboration on many issues has been difficult to achieve in Arizona for a number of reasons:

- Counties remain relatively weak with few powers granted by the Arizona Legislature, thus the most visible regional entity is often unable to act.
- Arizona's municipalities rely on a sales-tax-dependent fiscal structure that leads them into competition with neighboring cities for houses and retail businesses to generate revenue.
- Individual jurisdictions don't have incentives or power to act across borders, making it difficult to collaborate with their neighbors.

What Arizona does have are youthful political structures, rapidly changing demographics, and an involved business community that likes to work with government leadership. These assets could be brought to bear on resolving boundary issues.

Staggering Scope and Scale of Expansion

Arizona is now the nation's fastest-growing state, having increased by over 4 million people between 1950 and 2000. Another 6 million people could be added by 2040. The reasons, says economist Marshall Vest, are familiar:

- The U.S. population continues to shift to the South and West.
- Arizona and other Western states are perceived as offering second chances and new opportunities.
- Arizona historically has benefited from a combination of relatively affordable housing and a booming real estate market in California.
- Significant numbers of retirees and soon-to-be retirees are looking for the good life.
- A steady flow of immigrants are seeking jobs.
- High birth rates continue to shape Arizona's growth future.

MANY CYCLES AFFECT PUBLIC POLICY

TYPE OF CYCLE	TYPICAL TIME PERIOD
Business cycles	10 years
Election cycles	2-4 years
Legislative cycles	8 years
Drought cycles	25-35 years
Generations	30 years

Source: Morrison Institute for Public Policy, ASU, 2007.

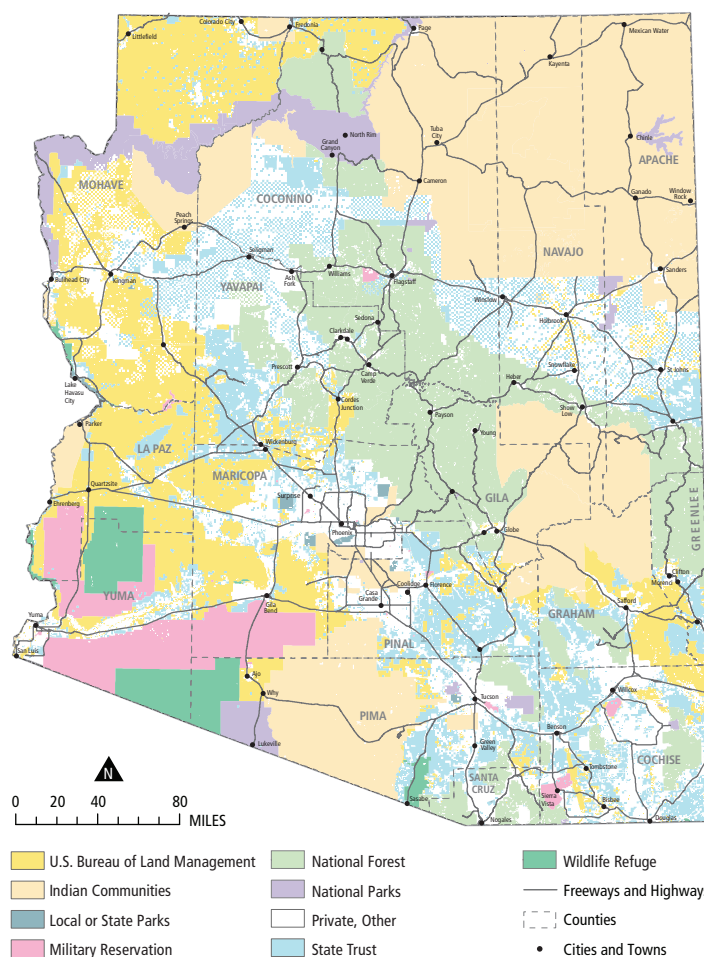
While the implications are serious, particularly for natural resources and land use, Arizona already ranks among the best in the nation for low energy usage per capita, and many cities and towns across the state have lowered their per capita water use over the last decade. In addition, the state's two recent Growing Smarter statutes have been credited for improving some areas of municipal and county planning. Nevertheless, with growth in the picture, it remains to be seen whether Arizona will improve on its 2001 below-average ranking by Renewable Resources Institute for the state's capacity for sustainable development.

A Strong Legacy of Optimism

Many signs point to the challenges Arizona faces in sustainability, but the state is not without past achievements and notable investments. As much as it has lagged in some areas, Arizona has also been an innovator at times. One encouraging aspect of the state is its streak of optimism that great things can be accomplished when appropriate attention and forces are brought to bear.

Because Arizona's biggest obstacles to sustainability are mainly rooted in political culture and choices, they can be changed. History clearly shows us that wise choices, smart growth, and sound investments are possible. But is there still time? Will Arizona play against type and act quickly and broadly enough to embrace a sustainable future? Arizonans are vitally interested in the answer. As environmentalist Rob Watson has been quoted by *The New York Times*: "People see an endangered species every day now when they look in the mirror."

ARIZONA HAS MANY PUBLIC LAND OWNERS



Source: Arizona Department of Transportation.

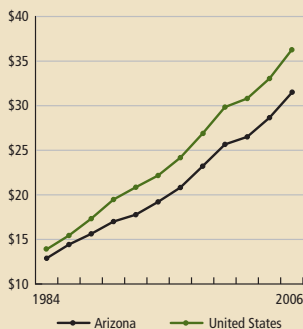
CAN A SUSTAINABLE ECONOMY BE A COMPETITIVE ECONOMY?

Dan O'Neill, CEO, DJT Enterprises, LLC

Being a good steward of the environment and our communities and being an efficient and profitable business are not mutually exclusive. In fact they are one and the same.

Lee Scott, President and CEO of Wal-Mart

ARIZONA INCOMES HAVE CONSISTENTLY LAGGED THE NATION (IN THOUSANDS)



Source: Morrison Institute for Public Policy, ASU; data from U.S. Bureau of Economic Analysis, 2007.

In 2005, Arizona led all 50 states in gross domestic product (GDP)* growth, a nearly 9% increase. That is impressive, but for those who closely track the state's competitiveness, it is simply one indicator among many. In fact, Arizona's economy remains competitive in some ways but not others. After more than 20 years of starting businesses and working with entrepreneurs – most recently at ASU Technopolis – I have come to learn that competitiveness and the practice of sustainability need to go hand in hand. The task now is to develop Arizona's competitiveness and sustainability at the same time. As UK cabinet minister, David Miliband, wrote while working to revitalize parts of that economy, "Economic dynamism can be combined with environmental and social responsibility. High financial returns can go hand in hand with respect for human rights, and the preservation of the planet's natural resources."

The term "sustainability" has been commonly used in business for some time. Consider the concepts of a "sustainable business model" or "sustainable competitive advantage." Recently, however, sustainability has come to mean something else, referring to growth of the economy while simultaneously improving environmental and social values. Given this new meaning, what would a sustainable and competitive Arizona economy look like?

First, we must understand the classic definition of economic growth. It means a rise in living standards, usually due to improvements in productivity and overall economic activity, and often with a strong export component. Economic growth can be generated in many ways, but one Arizona knows well is resource extraction and commodities production. Arizona's economy was dominated by such industries until the mid-20th century, relying on copper, cotton, cattle, and citrus. Another source of economic growth is to add value to products and services through knowledge-based activities such as design, engineering, and continual improvement. Related to this is innovation, which takes knowledge a step further by introducing new products, services, processes, and business models. Innovation can occur in any part of the economy from agriculture to semiconductors.

Innovation has proven to be one of the most important contributors to growth. Economist Joseph Schumpeter was talking about innovation in the 1930s when he described the concept of "creative destruction." This refers to the way innovative products and practices can spawn new industries while eliminating old ones – in the process, generating enormous amounts of new capital and income. Innovation, according to most economists, drives most productivity improvements and is the source of as much as half of economic growth nationally. We need only look to the rise of the Internet and related technologies in the 1990s to find

* State GDP is a counterpart to national gross domestic product (GDP), which is the U.S. Bureau of Economic Analysis's most comprehensive calculation of U.S. economic activity. It measures the market value of goods and services produced by labor and property in a given entity. State GDP was formerly known as gross state product (GSP).

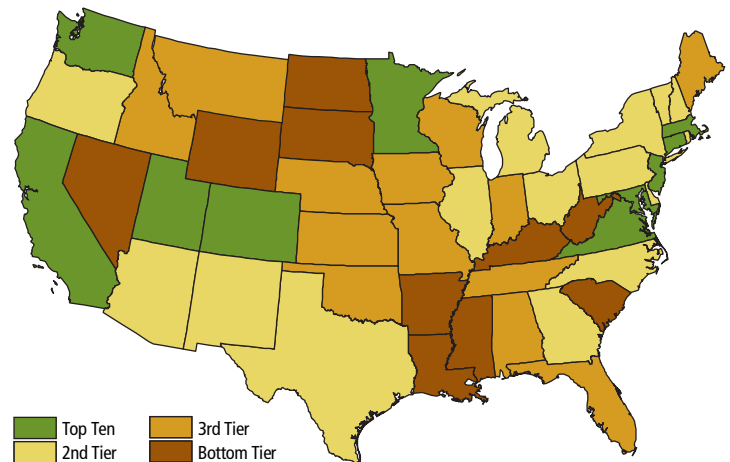
To expand standards of living over time, Arizona must be competitive in global export industries characterized by innovation and entrepreneurship. Arizona is working hard to expand innovation and entrepreneurship, but it still has far to go to match leading states. In the early 1990s and again in the early 2000s, economic leaders identified growth industries in which Arizona could be competitive globally and then developed plans to foster expansion. From 2002 to 2006, roadmaps were drawn for biotech and life sciences, advanced communications and information technology, and sustainable systems and solar energy.* These roadmaps identified existing strengths in research, technology, and enterprise formation, and then suggested target markets and action plans.

Some substantial investments have been made in these industries and their support systems as a result. Science Foundation Arizona was created in 2006 to help fund science research in the state through a combination of public and private money. University research and technology transfer have been enhanced with help from sales tax dollars earmarked by Proposition 301. New centers of innovation and entrepreneurship are underway, such as SkySong, the ASU-Scottsdale Innovation Center, a collaboration of city, university, and private entities on the site of the former Los Arcos Mall. New programs to teach innovation and entrepreneurship have sprung up in colleges and universities, spawning new research lines and ventures.

Arizona has long been recognized for expertise in advanced communications, information technology, and health care, and these areas have grown and benefited from recent investments. But the state's new biotech and life sciences segments have had to be created almost from scratch. Early bio successes include attraction of the International Genomics Consortium and the Translational Genomics Research Institute to Phoenix. Since their openings in 2002, they have been catalysts for research investments, educational programs, and institutional collaborations. Genomics accomplishments include identification of the genes responsible for memory and childhood epilepsy, and discoveries about certain types of cancer and diabetes. In addition, the Biodesign Institute at Arizona State University debuted in 2003 and has become the largest generator of bioscience research dollars in metropolitan Phoenix.

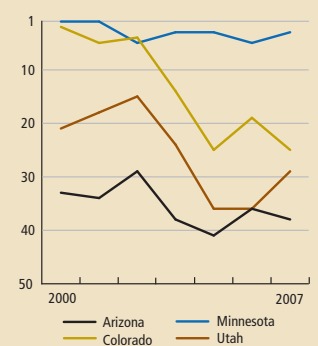
* For copies of the various roadmaps and economic plans, see www.azcommerce.com.

**ARIZONA RANKED AS SECOND TIER FOR
SCIENCE AND TECHNOLOGY CAPACITY IN 2004**



Source: Milken Institute.

**ARIZONA TRAILS
LEADERS IN JOB QUALITY
(RANKING AMONG 50 STATES)**



Note: 1 is highest rank.

Source: Morrison Institute for Public Policy, ASU; data from Corporation for Enterprise Development, 2007.

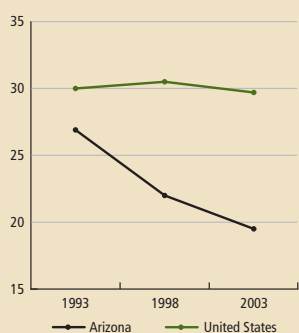
All of this activity has been enhanced by a new partnership led by the University of Arizona and ASU to create a medical school in downtown Phoenix that admitted its first class in July 2007. The medical school will serve as a research and development site as well as the training ground for physicians, pharmacists, and other health care professionals. In addition, support from The Virginia G. Piper Charitable Trust will help attract a significant number of world-class researchers to Arizona to augment the state's research capacity. These initiatives are already having a positive economic impact, though it will be years before we see the full value of new products, services, and ventures.

To become sustainable, however, Arizona must achieve global competitiveness while improving social and environmental qualities. This will require an appropriate mix of consumer and voter choices, free market mechanisms, and regulations. It will demand leadership, vision, and long-term commitment. Sustainability considerations will need to be embedded in all of our economic and workforce development priorities and plans. We will need to educate our children that these choices matter.

Centrally important is that more and more of the Arizona business community embrace sustainability as a competitive advantage instead of a cost. This should not be a stretch since Arizona already contains leading examples and the numbers are compelling. *Conscientious Commerce* suggests that a sustainability focus in a 50-person manufacturing firm could result in a 40% increase in profits through more efficient processes, better use of raw materials, and reduced waste. And as the ranks of sustainability-conscious consumers grow, good practices should result in improved images, greater customer loyalty, and stronger brands. Innovations in sustainable technology will also generate new profits by providing solutions to worldwide challenges created by exploding population growth and rapid urbanization. These should provide ample market opportunities for Arizona businesses.



SCIENCE & ENGINEERING DEGREES ARE DECREASING IN ARIZONA
(AS A PERCENTAGE OF ALL DEGREES)



Source: Morrison Institute for Public Policy, ASU; data from National Science Foundation, 2006.

From both the sustainability and competitiveness viewpoints, some of the greatest future opportunities for Arizona will be in emerging sustainability industries. With a wealth of university expertise in water management, forestry, and engineering, and a large number of new enterprises including solar energy, biodiesel suppliers, and “cool” building materials, many of the state's next big economic successes are expected to come from innovations in areas that are, at once, sustainable and profitable. These can lead to a wide variety of technologies, products, and services that could be sold around the globe.

Pavement is one example of a market opportunity. Considering that sidewalks, streets, and parking lots cover as much as 60% of an urban area, and that the majority of urbanization over coming decades will occur in arid and semi-arid climates, pavement will be a significant contributor to the heat island effect, energy waste, water pollution, and other problems. Arizona innovators are already working to create new types of paving to mitigate these issues. Future Arizona entrepreneurs could turn one of the results into a truly sustainable business – one that contributes to world livability, while creating wealth for its stakeholders.

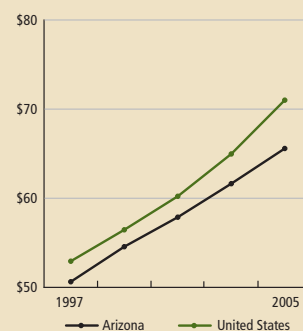
Other sustainability market opportunities await in waste management, energy, transportation, and community development, to name a few. Arizona could, and should, be a dominant global player in many of these areas, given the state's research and technology base and the need to solve the challenges presented by our arid climate. Fortunately, we have innovators and entrepreneurs in the race who are running hard.

So, what might a competitive and sustainable Arizona look like from an economic perspective? Arizona's economy would prosper from our ability to be entrepreneurial and globally competitive in high value, high growth global export industries that are driven by innovation. Arizona would dominate a few large market segments in targeted industries and, especially, key market segments of the sustainability industry. Arizona might even lead the world to a better urban development paradigm with new policies, practices, and technologies.

With these advantages, Arizona would attract substantial outside investment and major corporations. Homegrown innovators and entrepreneurs would launch ventures that grow to become Global 2000 companies. Sustainable entrepreneurship would generate tremendous new capital and income, while addressing many of the environmental and social challenges of our time. All in all, Arizona would reap the benefits of economic growth at the same time it improves environmental and social conditions.

Dan O'Neill is an experienced and well-traveled entrepreneur who has advised more than 200 early-stage innovators and company start-ups in the U.S., Europe, and Australia. He also serves as senior entrepreneurial coach for ASU Technopolis.

ARIZONA REMAINS BELOW U.S. AVERAGE IN GDP PER EMPLOYEE (IN THOUSANDS)



Source: Morrison Institute for Public Policy, ASU, data from Bureau of Economic Analysis, 2007.

LARGE AND SMALL FIRMS EMBRACE SUSTAINABILITY

GE SEES SUSTAINABLE PRODUCTS AND TECHNOLOGIES AS KEY TO BUSINESS SUCCESS

After more than a century of successful operation, General Electric realized that its customers were seriously concerned about greenhouse gas emissions and energy efficiency. In response, the company launched a major sustainability initiative called "Ecomagination" with plans to capitalize on the global need for environmentally sensitive products and technologies. GE – ranked by Forbes as second largest in the world with revenues in excess of \$160 billion – believes that one of the best ways to make money in coming years will be to develop products and technologies that address environmental problems. Among its eco-friendly products are new high efficiency washing machines and fuel-saving hybrid locomotives. Its environmental technologies include systems for desalination, coal gasification, and solar and wind power. The company's environmental technologies R&D budget is set to increase annually to \$1.5 billion by 2010 – a 100% increase over the 2005 budget – but GE expects that investment to double environmental revenues to \$20 billion annually.

NAVAJO FLEXCRETE RECYCLES AIR POLLUTANT TO BUILD AFFORDABLE ENERGY-EFFICIENT HOMES

Facing a shortage of high quality affordable housing on the Navajo Nation, the Navajo Housing Authority (NHA) decided in 2005 to invest in a new manufacturing plant near Page that can produce an innovative and environmentally friendly building material largely out of waste. The product, called Navajo FlexCrete, is an aerated concrete block containing 70% recycled flyash, a combustion by-product from the nearby coal-fired Navajo Generating Station. Navajo FlexCrete is expected to reduce the cost of housing on the Navajo Nation and elsewhere, making homes more affordable to buy and maintain. It also provides more insulation than conventional construction, which should lower energy costs for homeowners. Blocks from the Navajo FlexCrete factory have already been used in the construction of dozens of new homes, including a model Green Home built through a partnership between NHA and ASU's Stardust Center. At full capacity, NHA's factory is expected to recycle hundreds of thousands of tons of flyash to produce enough material to build many hundreds of Navajo FlexCrete homes per year.

Right: The "Guadalupe House" exemplifies sustainable, affordable housing using Navajo FlexCrete blocks. Photo Credit: ASU Stardust Center for Affordable Homes and the Family.



DOES SUSTAINABILITY MEAN BRIDGING THE GAP BETWEEN “HAVES” AND “HAVE NOTS”?

David Berns, Executive Vice President, Casey Family Programs and Former Director, Arizona Department of Economic Security (2003-2006)

I have long felt a deep dissatisfaction with society’s system for protecting those most in need. My whole career, therefore, has focused on changing the system. So I was surprised to be asked to state my views on sustainability from a social perspective. Why would we want to sustain a system that is often inadequate, inefficient, and ineffective, leaving huge gaps between the “haves” in our communities and the “have nots”?

SUSTAINABILITY IN THE SOCIAL realm means WANTING TO create and sustain new and BETTER SYSTEMS OF HUMAN SERVICES.

It took a while to recognize that sustainability in the social realm does not mean we want to sustain a status quo that is broken. Rather, it means we want to create and sustain new and better systems of human services in which every child, adult, and family is healthy, educated, safe, and economically secure. In short, we have to improve our systems – and be able to maintain the improvements – to bridge the divides.

To do this, we need new guiding principles for carrying out this mission. We need improved safety nets for the most vulnerable. We need a continuous upgrading of our resources, expertise, policies, and practices. Indeed, to realize this new vision for human services, we must let go of the old, ineffective, not-worth-sustaining practices and embrace positive new ways to improve the lives and families of those we serve.

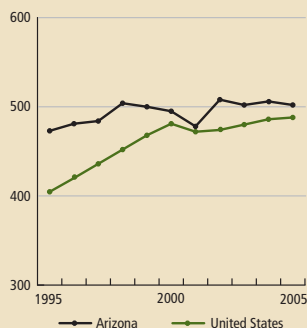
Understanding the Mission

Vice President Hubert Humphrey once noted: “The moral test of government is how that government treats those who are in the dawn of life, the children; those who are in the twilight of life, the elderly; and those who are in the shadows of life, the sick, the needy, and the handicapped.”

In Arizona, the primary agency responsible for meeting Humphrey’s moral tests is the Department of Economic Security (DES). This agency was created in 1972 for the expressed purpose of consolidating and coordinating a wide array of services and supports intended to address the economic well-being and protection of the state’s most vulnerable people. Today, DES operates programs that include child and adult protective services, foster care, adoption, welfare, Food Stamps, Medicaid eligibility, employment programs, vocational rehabilitation services, child support, and services for those with developmental disabilities. It also provides community supports in the areas of domestic violence, homelessness, work force development, aging, and family support services.

Unfortunately, the original dream of DES consolidation has never been implemented fully. As with many areas of government, DES programs tended to be driven by annual budgets,

ARIZONA INCARCERATES A HIGH PROPORTION OF ITS POPULACE (PER 100,000 POPULATION)



Source: Morrison Institute for Public Policy, ASU; data from U.S. Bureau of Justice Statistics.

SUSTAINABILITY IS equity over time.

Robert Gilman, Astrophysicist and President, Context Institute

legislative mandates, and line-item appropriations. Consequently, individual programs operated in isolation as they focused on compliance with state and federal rules. Their workers, in turn, were held accountable more for the timeliness of their paperwork than for their success in helping families get jobs or keeping children safe. The problem with this approach became apparent my first day on the job in 2003.

MORE ARIZONA CHILDREN MUST COPE WITH HIGH-POVERTY NEIGHBORHOODS THAN IN THE U.S. AS A WHOLE

	ARIZONA		U.S.	
	1990	2000	1990	2000
% Children below poverty	22.0	19.3	18.3	16.6
% Own children in single-parent households	20.9	23.5	20.2	23.3
% Teens who are high-school dropouts	14.4	14.8	11.2	9.8
% Children living in high-poverty neighborhoods	29.1	29.4	23.0	20.4

Source: Morrison Institute for Public Policy, ASU; data from Population Reference Bureau, analysis of data from the U.S. Census Bureau, for The Annie E. Casey Foundation.

Recognizing the Problem

When I became director of DES in August 2003, I was told we did not have enough money in our budget to make all of our committed welfare payments for the year. Instead, we were projected to experience a shortfall of \$28 million dollars. In human terms, that translated as 50,000 families who would not receive cash payments for the last two months of the year. This was intolerable. How we could be in such a disastrous situation only one month into the fiscal year?

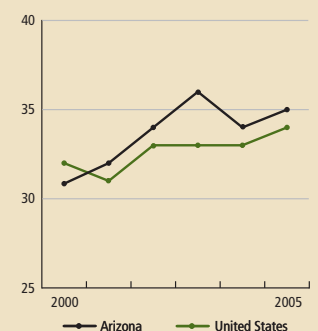
The reason for the shortfall was that Arizona was experiencing the fastest growing welfare caseload in the country. In the previous 2½ years, Arizona's welfare caseload had increased by an incredible 56%, while the nation's caseload had declined 3%. Some felt the reason for Arizona's caseload growth was its poor economy; but the state was actually better off economically than most of the rest of the country. Others suggested the cause was rapid population growth; but Arizona's population increase was only about 7.5% and most of the new people were coming to Arizona either because they had jobs or they were comfortably retired. None of the caseload was due to undocumented people from other countries; they simply did not qualify for benefits.

In reality, the main cause of the rising caseload and resulting budget deficit was that DES had become highly effective at getting people into the system, but woeful at getting them out. More specifically, the division that determined eligibility was admirably efficient at placing needy families on welfare, while the division that helped welfare clients find employment had them backed up for four to six months just to see a job counselor. This was a shock to me.

In Colorado, where I previously worked, 50% of the people who applied for financial assistance never had to take a welfare check because they were helped to find a job within days of visiting the office. In contrast, Arizona DES had diverted only 13 people from welfare to work in the entire previous year.

This clearly had to change. Instead of the status quo, we had to find a way — a sustainable way — to provide people what they needed, when they needed it, so they could become economically secure and safe. Fixing the problem would require immediate overhaul of our approaches and practices such that we would invest our resources, not in more welfare checks, but in finding more and

ARIZONA HAS CLIMBED ABOVE U.S. AVERAGE IN PERCENT OF CHILDREN WITH NO EMPLOYED PARENT



Source: Morrison Institute for Public Policy, ASU; data from The Annie E. Casey Foundation, 2007.

ARIZONA RANKS LOW ON CFED'S EQUITY INDEX

COMPONENT	RANK*
Poverty rate	38
Income distribution	42
Income distribution change	37
Economic disparity between urban and rural areas	15
Overall Index Rank	37

*Among 50 states and District of Columbia. 1 is the best in this case.

Source: Morrison Institute for Public Policy, ASU; data from Corporation for Enterprise Development, 2007.

better paying jobs for our clients and increasing supports to help them maintain that employment. We did just that. By June 2006, the number of families diverted from welfare to work increased from 13 to 1,750, and overall Arizona had 11,000 fewer families on welfare. And with the turnaround, Arizona quickly went from the fastest growing welfare state to one of the fastest declining, a much more sustainable direction. It all started with setting common goals.

Developing a Unified Vision

In an organization like DES it is difficult to define a few overarching goals and measures of success because the agency operates so many programs and its workers perform such a variety of roles. Despite the difficulty, we learned that we would never function in a sustainable manner if we did not have a clear understanding of what we needed to work on together. Using a collaborative approach, we settled on three goals that had crosscutting implications for nearly all aspects of our agency.

• GOAL ONE: INCREASE THE ECONOMIC SELF-SUFFICIENCY OF OUR CUSTOMERS.

Most of our divisions have a role in promoting the economic self-sufficiency of our customers. This includes helping welfare recipients get jobs, assisting persons with developmental disabilities become as independent as possible, and helping the elderly supplement a modest retirement income. Even the child welfare area is involved because most of the families in our system are living below poverty levels. To sustainably improve the well-being of adults and the safety of children, we must provide employment and other economic supports for clients and their families.

• GOAL TWO: REDUCE INSTITUTIONAL PLACEMENTS FOR CHILDREN AND ADULTS WHILE INCREASING COMMUNITY SUPPORTS FOR OTHER VULNERABLE POPULATIONS.

Many vulnerable children and adults need to be with their own families in their own communities, but Arizona has a mixed record in this regard. The state has had a higher percentage of young children placed in institutions than any other state, yet it is among the best in the country for providing home-based supports for the elderly and those with developmental disabilities. To become sustainable in this area, we decided to focus on building on our strengths supporting vulnerable adults while finding new ways to overcome our shortcomings with children. We made progress. From June 2005 to June 2006, the number of children under 7 in group homes decreased by 62% and children under 4 in shelters decreased by 55%.

• GOAL THREE: STRENGTHEN FAMILIES TO PROVIDE FOR THE SAFETY OF CHILDREN AND REDUCE THE NEED FOR REMOVAL OF CHILDREN FROM THEIR PARENTS WHEN POSSIBLE.

Strengthening families is the goal of virtually every program in DES. To help us become more sustainable in this effort, we decided to measure agency success based on the increases in supportive in-home services that actually result in a reduced need for foster care.

Measuring Success as Outcomes

The agency's three goals constitute both the vision and the measures for sustaining quality human services in Arizona. The means for achieving these goals, however, must always remain flexible. Past experience has shown that approaches that do not change and evolve tend to become obsolete and ineffective. Our effort, therefore, always has to be directed toward the outcome, not the activity. Our resources must be invested in child and family well-being, not in simply maintaining old programs. In this way, our greatness as an agency will be measured,



not by what we do, but rather by what our families accomplish – how well they close the gap between what they have and what they need. Similarly, our practice will become sustainable only when our success is defined by the accomplishments of those we serve.

What does it take to approach sustainability for the state's most vulnerable families and children, and by extension, its communities? With a staff of more than 10,000 employees and annual funding of nearly \$3 billion, DES possesses significant resources to carry out its mission. Yet even with all these people and the substantial sum of money, the problems faced by vulnerable people far exceed available state resources. Such a situation places great pressure on DES and other agencies to use their resources wisely, efficiently, and effectively. Not only must agency programs work seamlessly together toward a common goal, but their public resources must be used to leverage private and community support organizations so that we work together with them rather than compete with or replace them.

In the end, the key to sustainable success is the concept of partnership. Public agencies must apply their resources and services in ways that effectively partner them with individuals, families, and communities, as well as with businesses, faith-based organizations, nonprofits, and other service providers. This will give Arizona the means to strengthen and sustain its communities.

David Berns previously served as director of the El Paso County Department of Human Services in Colorado and director of two social services agencies in Michigan. The Casey Family Programs is a Seattle-based organization serving children, youth, and families in the child welfare system.

SUSTAINABLE
ECOSYSTEMS
require
SUSTAINABLE
economies,
and vice versa.
SUSTAINABLE
SYSTEMS ALSO
require SOCIAL
STABILITY.

G. Jon Roush, Board Member,
Indian Law Resource Center

STATE AND INTERNATIONAL PROGRAMS IMPROVE LIVES AND COMMUNITIES

MINNESOTA ACT LINKS HOUSING, JOBS, AND SERVICES TO ENCOURAGE AFFORDABLE, LIVABLE COMMUNITIES

As Minnesota's cities began feeling the strain of rapid population growth in 1995, its legislature passed the Livable Communities Act (LCA). The LCA funds an incentive-based grant program to encourage redevelopment projects and affordable housing for middle and low income families. LCA funding also helps create parks, hiking and biking trails, and greenways in local neighborhoods. Grant programs promote three main goals: 1) developments that closely link housing, jobs, and services, 2) clean-up of brownfields for redevelopment, job creation, and wetlands, and 3) new and rehabilitated affordable housing for purchase and rental. From 1996 through 2006, the LCA provided 472 grants leveraged by private and other public investments. Related projects are expected to produce 25,000 new and retained jobs, over 23,000 new and rehabilitated housing units in infill and redevelopment projects, and a \$67 million increase in tax capacity.

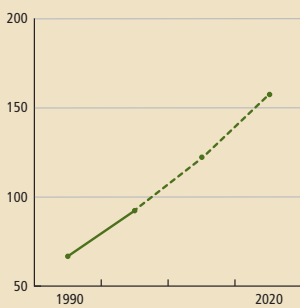
GRAMEEN BANK EXTENDS MICRO-CREDIT TO END POVERTY IN BANGLADESH AND THE WORLD

Since 1976, Grameen Bank has been extending small loans to the poorest people of Bangladesh – one of the world's most poverty-stricken nations. Its ambitious goal is to end poverty worldwide. For this work, Grameen Bank won the 2006 Nobel Peace Prize. The bank operates under the belief that the neediest people should be given highest priority in getting loans. These loans – often less than \$25 – can kick off entrepreneurial activity that lifts entire families out of debt and squalor. The bank requires no collateral and often charges no interest, but after making a loan it monitors clients' welfare and capacity to survive disasters and emergencies. Since its founding, Grameen Bank has disbursed more than \$6 billion in loans, with a recovery rate of 98%. The vast majority of its clients are women in almost 77,000 villages. Astute entrepreneurs, the bank's clients have also proven to be capable savers. In 2006, deposits in savings accounts were 138% of outstanding loans.

WILL INACTION AND GROWTH STYMIE SUSTAINABILITY AND ENVIRONMENTAL EFFORTS?

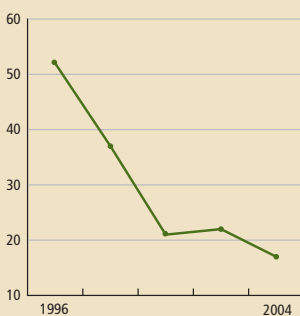
Luther Propst, Executive Director, Sonoran Institute

ARIZONA GREENHOUSE GAS EMISSIONS ARE PREDICTED TO RISE (MILLIONS OF METRIC TONS OF CARBON DIOXIDE)



Source: Center for Climate Strategies.

ARIZONA'S WATER QUALITY IS IMPROVING (PERCENT IMPAIRED WATER)



Source: Morrison Institute for Public Policy, ASU; data from National Water Quality Inventory Report to Congress, U.S. Environmental Protection Agency.

Arizona is a unique and magnificent place with a landscape that stirs deep passion – wide open spaces, historic ranches, unique vegetation, and a distinctively Western character. Arizona also shares with much of western North America a desirable, competitive niche in the global economy. Nowhere else in the world do we find advanced, diverse economies thriving in close proximity to a combination of expansive public lands, abundant wildlife habitat, and vast wild areas that make it possible for many to enjoy world-class recreation and scenery as part of their daily lives. Being surrounded by this diversity of natural amenities is one of Arizona's key economic advantages in an increasingly global economy. As technology allows the global economy to reach into once remote areas, our natural amenities draw bright, talented people with ideas and investment capital.

But dramatic changes are at work in Arizona and the West. Resource extraction such as logging, mining, and ranching – once the region's economic mainstays – account for an ever-shrinking share of employment and income. Instead, knowledge-based services, health care, and related industries have become the dominant sources of prosperity, along with retirement and investment income.

The Sonoran Institute recently published *Prosperity in the 21st Century: The Role of Protected Public Lands*, which shows that the West's economy is increasingly driven by people's decisions about where they *want* to live, rather than where they *have* to live; indeed, the trend has shifted from "jobs first, then migration," to "migration first, then jobs" as entrepreneurs choose quality of life over other business factors. In addition, retired or "downshifting" baby boomers are drawn to communities that are surrounded by scenic landscapes and protected public lands. As a result, protecting the state's magnificent scenery and open lands is now an essential strategy for promoting economic prosperity. A study by the Sonoran Institute and the Theodore Roosevelt Conservation Partnership reports that hunters and anglers, alone, spend more than \$548 million annually in Arizona.

Like other states in the Intermountain West, Arizona has a difficult set of tasks to, at once, preserve our natural heritage, promote a diverse economy, and deal with the state's rapid growth. To accomplish these complementary goals, we must come to agreement on how to address the acute challenges that confront Arizona's progress toward a sustainable future. We need to find solutions for the effects of rapid population growth, sprawling development patterns, ineffective regional growth planning, and an outdated system for managing groundwater.

HUMAN MISUSE OF ENVIRONMENTAL ASSETS IS DRIVING ENVIRONMENTAL CHANGE, AND THIS DEMANDS ACTION NOW.

The World Conservation Union

Four Policy Reforms for a Sustainable Future

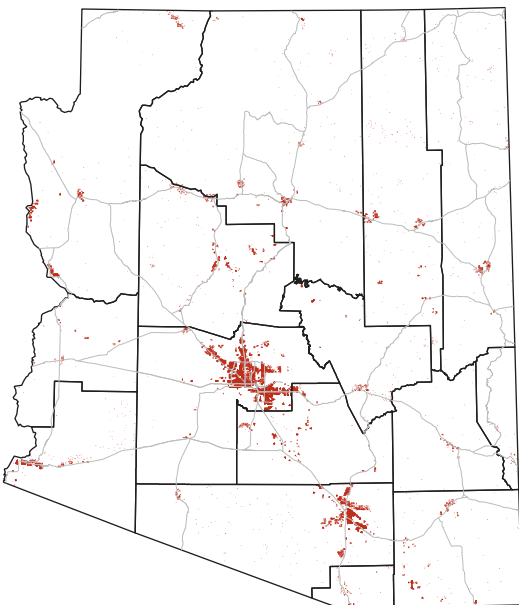
The scale and pace of projected growth requires a degree of innovation and policy reform in Arizona that we have not seen since the passage of the Groundwater Management Act in 1980 and creation of the Heritage Fund in 1990. Due to differences of opinion, however, our leaders have been slow to act. Fortunately, Arizona voters recognize that the state's economic prosperity requires safeguarding our environmental quality and ensuring our quality of life. Over the past decade in Arizona, according to the Trust for Public Land, voters have approved all 22 municipal, county, and state ballot measures to raise money for protection of sensitive lands. These have collectively provided the funding for a \$1.7 billion dollar investment in preserving our desert heritage. Successful ballot measures have ranged from Scottsdale's approval of over \$700 million since 1995 for open space, habitat, and wildlife protection to Pima County's approval in 2004 of \$271 million to implement the Sonoran Desert Protection Plan. The latter has become a model for counties across the nation seeking to balance economic growth with wildlife protection.



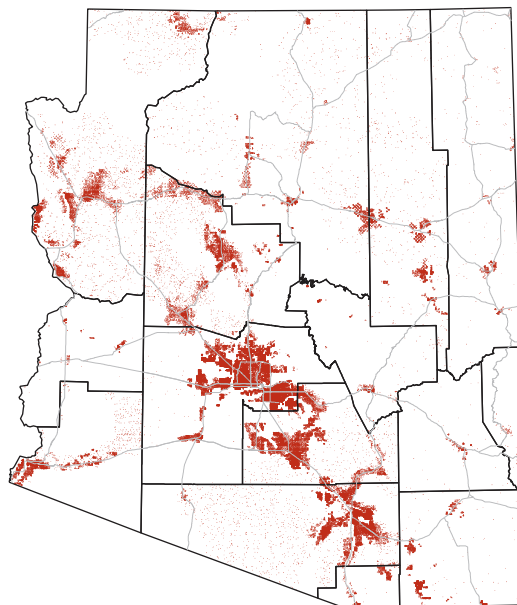
PROTECTING THE STATE'S MAGNIFICENT SCENERY AND OPEN LANDS IS NOW AN ESSENTIAL STRATEGY FOR PROMOTING ECONOMIC PROSPERITY.

ARIZONA'S DEVELOPED LAND AREA WILL GROW DRAMATICALLY

2000 POPULATION – 5.1 MILLION



EXPECTED 2050 POPULATION – 16 MILLION



Note: Populated areas shown in red.

Source: Morrison Institute for Public Policy, ASU; map adapted from Maricopa Association of Governments.

Sustainable development... requires maintaining the carrying capacity of the resource base and, at the same time, developing the knowledge and the technology to increase carrying capacity.

Charles Wilkinson, University of Colorado,
Professor of Law and Author of *The Eagle
Bird: Mapping a New West*

MORE ARIZONANS WORK AT HOME...

RANK AMONG 50 STATES	STATE	% EMPLOYEES WORKING AT HOME
1	South Dakota	6.1
2 (tie)	Colorado	6.0
2 (tie)	Montana	6.0
15	ARIZONA	4.0
Average	U.S.	3.6

Source: Morrison Institute for Public Policy, ASU; data from American Community Survey, U.S. Census Bureau, 2005.

...THAN COMMUTE BY PUBLIC TRANSPORTATION

RANK AMONG 50 STATES	STATE	% EMPLOYEES COMMUTING BY PUBLIC TRANSIT
1	New York	25.8
2	New Jersey	10.3
3	Maryland	8.5
Average	U.S.	4.7
20	ARIZONA	1.9

We must put aside our differences and come together to address four of the most pressing, important, and feasible policy reforms needed to steer Arizona toward a more sustainable future. State leaders must:

- Promote cross-boundary thinking and effective regional planning among Arizona's major cities
- Update management of groundwater in Arizona
- Create a statewide funding source to provide adequate funds for protecting and restoring natural resources, natural areas, and other community assets
- Make Arizona a leader in promoting clean, renewable, and sustainable energy

Promote Cross-Boundary Thinking and Effective Regional Planning

Between 1990 and 2000, the state's population grew by 40%, making Arizona one of the fastest growing states in the nation. As of July 1, 2005, Arizona's population was almost 6 million according to the Arizona Department of Economic Security – and the population is projected to double by 2040 to almost 12 million. This growth is causing the greater Phoenix and Tucson metropolitan areas and beyond to merge into a single megapolitan area known as the Sun Corridor. Dealing with it requires thoughtful planning to ensure that services that cut across municipal and county boundaries – including transportation, water management, and conservation of natural areas – are sufficient. In short, Arizona badly needs a more regional, comprehensive, and creative approach to managing the state's growth.

Update the Management of Groundwater

Arizona is experiencing a long-term drought that exacerbates the demands of a growing population on finite water supplies. The system for managing Arizona's groundwater has not kept pace with either population growth or changing climate conditions. The 1980 Groundwater Management Act (GMA) established a detailed system for managing groundwater resources within designated Active Management Areas (AMA) in the major urbanized areas of Maricopa, Pima, Pinal, Santa Cruz, and Yavapai counties, as well as a few rural areas in which severe groundwater overdrafts were occurring as a result of irrigation. In the 26 years since passage of the GMA, no other AMAs have been designated, despite rapidly increasing use of groundwater throughout the state. In fact, outside of the AMAs,

groundwater use is essentially unregulated. Consequently, Arizona faces ongoing ecological decline – especially along the state's remaining intact river systems – as unregulated groundwater pumping increases. This pumping threatens to deplete the aquifers that sustain some of the most important rivers and streams remaining in Arizona, such as the Bill Williams, San Pedro, Santa Cruz, and Verde rivers. To protect our quality of life and economic prosperity, we must update and reform the GMA to address current realities for the state's population, climate conditions, and sprawling urban footprint of cities and towns.

ARIZONANS CONTINUE TO DEPEND ON GROUNDWATER

ARIZONA WATER SOURCE	%
Groundwater	40
Colorado River	20
Central Arizona Project	19
Other Surface Water	19
Effluent	2

Source: *Arizona's Rapid Growth and Development*, 88th Arizona Town Hall, 2006.



Create a Statewide Funding Source for Protecting and Restoring Natural Resources, Natural Areas, and Other Community Assets

A key factor in Arizona's landscape, economy, and quality of life is its mosaic of public and private lands. Almost half of Arizona is public land managed by the National Park Service, U.S. Forest Service, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service. In addition, Arizona has an important and growing system of state and local parks and wildlife preserves. Together these lands protect drinking water for our cities, provide wildlife habitat, and offer opportunities for hunting, fishing, hiking, mountain biking, bird watching, and other forms of outdoor recreation.

PROTECTING PUBLIC LANDS AND ENSURING THE STATE'S ECONOMIC PROSPERITY are COMPATIBLE.

Increasingly, we realize that protecting these public lands and ensuring the state's economic prosperity are compatible; that our lands and waters are a principal long-term advantage in an increasingly global economy; and that the recreational opportunities they provide attract the bright, creative people who are the backbone of a modern economy. That is why, in 1990, Arizona voters created the Arizona Heritage Fund, designating up to \$20 million a year from lottery sales for protecting the state's wildlife and natural areas. The Heritage Fund provides essential funding for parks, open space, trails, historic preservation, and endangered species protection, as well as urban wildlife projects. Regrettably, this source of funds is inadequate, given the magnitude of the challenges today. What Arizona needs is a new, more flexible, and assured source of funds for protecting Arizona's natural treasures and our long-term prosperity.

Make Arizona a Leader in Promoting Clean, Renewable, and Sustainable Energy

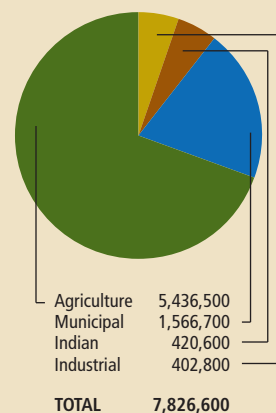
To promote a prosperous future, protect the health of our watersheds and water supplies, and restore our wildlife habitat and open lands, Arizona must develop alternative energy sources. Fortunately, Arizona has vast and largely untapped fuel resources, particularly solar and wind power, and we have started to encourage the use of these and other alternative energy sources. In 2006, the Arizona Corporation Commission voted to ensure that an increasing percentage of our electricity, up to 15% by 2025, be produced from solar, wind, and other renewable sources. The Corporation Commission is also requiring that more of our power be generated from "distributed" sources, closer to where it will actually be used. Meeting the goal of 30% of Arizona's power coming from distributed sources by 2011 will motivate solutions such as solar

ENERGY AND ELECTRICITY ARE IN EVER-HIGHER DEMAND IN ARIZONA

YEAR	TOTAL CONSUMPTION (TRILLION BTU)		PER CAPITA CONSUMPTION (MILLION BTU)	
	ENERGY	ELECTRICITY	ENERGY	ELECTRICITY
1980	755.3	396.3	277.8	145.8
1990	950.5	654.1	259.3	178.4
2001	1,353	926.3	255.4	174.8

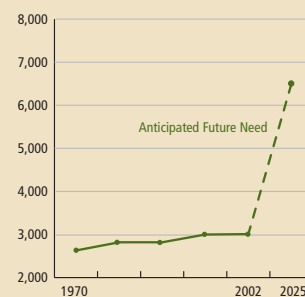
Source: *Arizona's Rapid Growth and Development*, 88th Arizona Town Hall, 2006.

WHO USES WATER IN ARIZONA? (WATER DEMAND IN ACRE-FEET BY SECTOR, 2003)



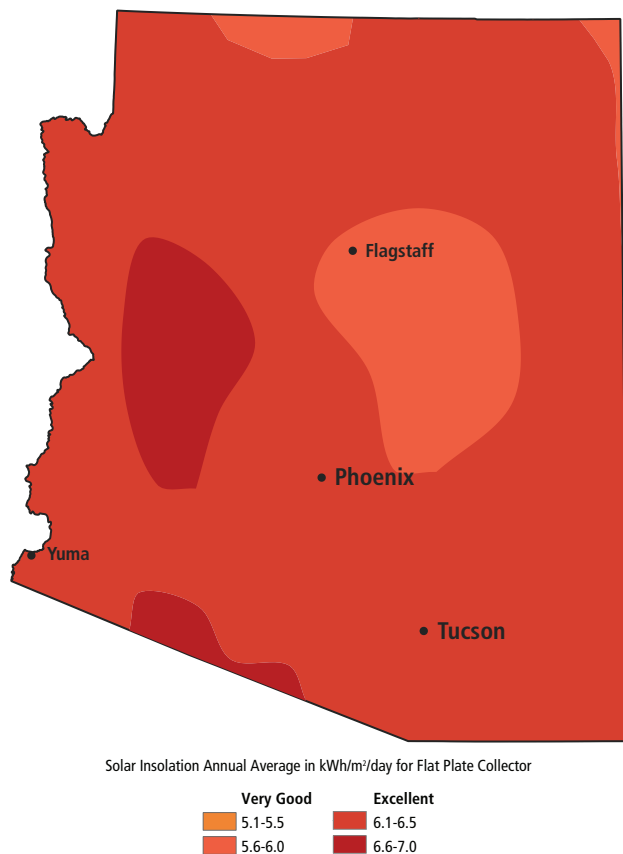
Source: Morrison Institute for Public Policy, ASU; data from Arizona Department of Water Resources, *Arizona Water Atlas*, Vol. 1, 2006.

ARIZONA RENEWABLE ENERGY GENERATING CAPACITY (IN MW)



Source: Morrison Institute for Public Policy, ASU; data from U.S. Department of Energy and APS.

ARIZONA'S SOLAR POTENTIAL RANGES FROM VERY GOOD TO EXCELLENT STATEWIDE



Source: U.S. Department of Energy, 2002.

panels on homes, shopping centers, and schools. Arizona also needs to embrace other steps to reduce carbon emissions and fossil fuel dependence, including new community designs that promote alternatives to automobiles, such as bicycling, transit, and walking.

The Choice? A Sustainable Future or Immeasurable Loss

The signs are there: Arizona's rapid and largely unmanaged growth threatens to undermine the foundation of our quality of life and economic prosperity. If we wish to protect our natural assets, Arizona's political leaders and voters must join forces to create a more environmentally sustainable and healthy future. Specifically, we must acknowledge and agree that regional challenges, such as transportation and protection of regional open space networks require regional thinking and regional solutions; that water management in the state lags behind the reality of growth and water consumption; that the state needs a new, more reliable and sustained source of funds to protect and restore our landscapes and river systems; and that Arizona will be a more vital and prosperous state when we tap fully into the state's vast reservoir of clean, renewable energy, especially solar and wind. Only then can we focus on the actions necessary to make Arizona more sustainable.

Luther Propst is cofounder of the Sonoran Institute, coauthor of *Balancing Nature and Commerce in Gateway Communities*, and adjunct professor in the School of Renewable Natural Resources, The University of Arizona.

STATE POLICIES AND CITY SERVICES PROMOTE SUSTAINABLE PRACTICES

CALIFORNIA'S MILLION SOLAR ROOFS PLAN WILL BOOST CLEAN POWER FOR THE STATE

California plans to capitalize on its sunshine by creating a million solar roofs on homes and businesses by 2017. One million roofs would generate an estimated 3,000 megawatts (MW) of clean electricity, and reduce greenhouse gas emissions by 3 million tons compared to the use of coal-fired power plants. This initiative is modeled after a successful Japanese program in the 1990s that used financial incentives to spur demand and achieve economies of scale for photovoltaic (PV) systems, making Japan the top solar powered country in the world. California's primary incentives of cash rebates and tax credits are expected to help the state capture a major share of the PV industry and place California in close competition with world solar leaders Japan and Germany.

PORTLAND AGENCY HELPS CITY AND ITS BUSINESSES OPERATE MORE EFFICIENTLY

Portland, Oregon was named America's most sustainable city in 2006 by SustainLane, a firm that tracks government sustainability metrics. One reason for that honor is Portland's Office of Sustainable Development (OSD), which helps businesses build energy-saving structures and supports local food growers. OSD also enables the city to function more sustainably by leveraging funds to increase recycling, reduce landfill use, decrease carbon dioxide emissions, and improve energy conservation. A recent report credits OSD with helping the city reduce greenhouse gas emissions to 1% above 1990 levels and save \$2.2 million per year in energy costs through greater efficiency and use of renewable supplies.

HOW CAN ARIZONA KEEP SCORE ON SUSTAINABILITY?



Sports fans use detailed statistics for comparing teams and players. Businesses tally a myriad of measures to calculate the bottom line. And nearly every head of household balances a checkbook or tracks savings. The idea of keeping score is basic to our lives; it is essential for evaluating the performance of the things we care about. In the past 10 to 20 years, numerous benchmark and indicator projects have measured the status of important issues, including the *What Matters** series from Morrison Institute for Public Policy, which reports on quality of life data for metropolitan Phoenix. While these efforts provide a valuable snapshot of how things look at any given time, their greatest strength is in illustrating the trajectory of progress across defined time intervals, be it a month, a year, or a generation. A trajectory tells us at a glance whether something is going in the right direction or the wrong one. In sustainability, trajectories are a key part of knowing what path we are on.

AN INCREASING NUMBER OF PRODUCTS HAVE BEEN DEVELOPED THAT BALANCE THE VALUE OF ENVIRONMENTAL AND SOCIAL GOODS WITH ECONOMIC INDICATORS

With more and more interest focused on sustainability, both the public and private sectors have a need for appropriate measures to monitor and evaluate the effects of sustainability policies. The task is challenging, however, because of the difficulty inherent in integrating measures across the environment, economy, and society. Generally, indicators in each of these areas have been viewed in isolation from each other. For example, common measures of economic output, such as gross domestic product (GDP), have usually failed to value either the benefits of infrastructure and ecosystem services or the social costs of poor health and natural catastrophes.

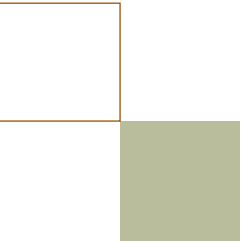
Nevertheless, an increasing number of products have been developed that balance the value of environmental and social goods with economic indicators to determine the overall sustainability status of nations, states, and localities. Related products have been created to assess how ready states are to make sustainability an everyday reality. Some notable models worthy of further examination follow.

- **GENUINE PROGRESS INDICATOR (GPI)** Developed by the nonprofit group, Redefining Progress, the GPI has been applied at both the national and county level. This set of indicators distinguishes itself by adding to standard GDP the value of non-market goods, such as the value of household and volunteer work, services from consumer durables (e.g., cars and refrigerators), and services of infrastructure, such as streets and highways. It also subtracts from GDP the non-market value of such things as money spent defensively (e.g., for repairs, home security, insurance, and water filtration), the social cost of divorce, and the depletion or degradation of environmental resources.

While modern thinking has expanded to encompass the concept of sustainability, our capacity to manage for it is just beginning to take shape.

The State of the States,
Resource Renewal Institute

* See www.morrisoninstitute.org for reports from 1997-2004.



Indicators...show trends in what is happening, letting us understand where we have come from and where we are now. From there we can begin analyzing why things are happening, and determine what we want to do next to help move our society in the right direction.

Living with the Future in Mind,
New Jersey Sustainable State Institute

- **OREGON BENCHMARKS** A broad set of 90 indicators, Oregon Benchmarks measures progress toward the state's three sustainability goals: quality jobs; engaged, caring, safe communities; and healthy, sustainable surroundings. These goals resulted from a strategic vision created by a task force of Oregon business and community leaders called the Oregon Progress Board, which was created by the legislature and is chaired by the governor. The benchmarks are in seven categories: economy, education, civic engagement, social support, public safety, community development, and environment. State agencies must link their performance measures to the benchmarks, which have been in place for more than a decade.
- **U.S. CITY SUSTAINABILITY RANKING** This product of SustainLane, an independent online resource on sustainability for government and businesses, rates the status of sustainability programs, policies, and practices for the nation's 50 largest cities, including Tucson, Phoenix, and Mesa. It covers 15 categories that include metro congestion, air quality, tap water quality, city innovation, planning/land use, green economy, and energy/climate.
- **SUSTAINABLE COMPETITIVENESS INDEX** San Diego's sustainability benchmark tool monitors the balance among economic, environmental, and equity elements for the region. These are considered essential elements for developing and maintaining a competitive business climate. Developed by a joint effort of the San Diego Association of Governments and the San Diego Regional Economic Development Corporation, the index evaluates 20 indicators in 14 categories such as standard of living, air quality, income distribution, housing affordability, childhood education, investment in waste management and water supply, and investment in goods movement infrastructure. The index is also used to compare San Diego against 18 metro competitors including Seattle, Denver, and Phoenix.
- **LIVING WITH THE FUTURE IN MIND** New Jersey's set of 41 sustainability indicators is organized around 11 goals developed by a 1995 stakeholder process that involved business, government, and community participants. Goals for the state include economic vitality, quality education, healthy people, efficient transportation, decent housing, and ecological integrity. Each indicator associated with one of the goals is intended to have a target value and date, though not all targets have yet been established. The project is administered by an independent institute called the New Jersey Sustainable State Institute, which originated with New Jersey Future, a nonprofit organization that organized the 1995 stakeholder initiative. All state agencies are required to enact policies compatible with the project's goals.
- **GREEN PLAN CAPACITY INDEX** The GPC Index from Resource Renewal Institute combines 65 indicators in environmental management, environmental policy innovation, fiscal and program commitment, and quality of governance in order to assess the ability of individual states to implement viable policies for sustainability. The GPC Index was featured in the group's 2001 report, *The State of the States: Assessing the Capacity of States to Achieve Sustainable Development Through Green Planning*. Arizona was ranked 29th overall by the 6-year-old index, but was cited for strong commitment to innovation and strategic planning. Green planning, according to Resource Renewal Institute, applies the business model of managing for results to achieve long-term environmental and economic goals and to secure a high quality of life for present and future generations.

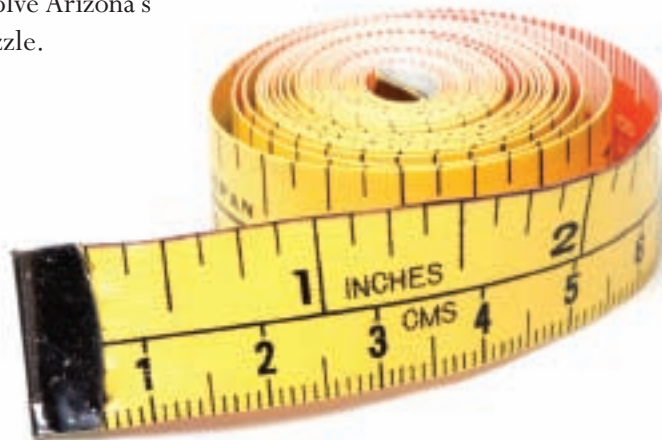
What sets the described benchmarks and indicators apart from earlier attempts to measure economic and quality of life issues? Each method is unique in approach and execution, yet viewed as a whole they contain a number of practical and advantageous characteristics. These scorecards:

- Originate from a major long-term planning process
- Comprise a cohesive, long-term view of progress in a state or locality
- Involve achieving balance among different categories of indicators
- Stimulate action by setting goals and targets for results
- Stay in the public eye through reports and media attention generated by their champion, which is often an appointed board, nonprofit institution, or public agency
- Benefit from public interest as well as political leadership to give them lasting power
- Build on experience, allow for adaptation and modification, and spell out their own shortcomings
- Require states and localities to face hard facts by expecting and measuring improvement in even the toughest problems

A SCORECARD NEEDS A LEADER AND CHAMPION WITH THE RESOURCES AND AUTHORITY TO BUILD CONSENSUS AND COMPLETE A PROTOTYPE.

A sustainability scorecard for Arizona should be unique to the state's specific conditions and interests. Building on the experiences of others can help Arizona develop its own scoring system. Such a project needs a leader and champion with the resources and authority to build consensus and complete a prototype.

This report already illustrates the state's current trajectories in many key areas. Additional assessments of Arizona's sustainability can be found in many places, including the Resource Renewal Institute's *State of the States* report. When Arizona has a unified strategic vision for statewide sustainability, a set of comprehensive goals with indicators and targets, and a monitor to oversee the process, Arizona will possess the tools it needs to measure progress on its sustainability journey. These will help state and local leaders solve Arizona's sustainability policy puzzle.



The issue is that virtually every new invention, every problem that we solve, every policy that we implement disadvantages some people and advantages others. What we need to do is to ensure that our approaches to sustainability don't, in fact, widen the gap between the haves and have-nots. I would challenge every engineer, every business person, and every politician to ask when making decisions from the smallest to the grandest: What are the cascading implications of this decision for all segments of the population?

Charles Redman, Director, School of Sustainability, Arizona State University



LEADING THINKERS SPEAK OUT ON SUSTAINABILITY

Whosoever desires constant success must change
his conduct with the times.

Niccolò Machiavelli, 16th Century Italian Political Theorist

The subject of sustainability is undeniably deep and wide-ranging. Not surprisingly, people have expressed numerous opinions from diverse perspectives on what to do and how it should be done. In the following pages, 24 leading thinkers from Arizona and the national discourse tender their ideas. These thought-provoking essays are organized in the following categories:

IMPROVING PRACTICES	42
LEVERAGING ASSETS	48
DEFINING NEEDS	54
MAKING DECISIONS	60

Sustaining Resources Makes Good Business Sense

Brad Casper, President and CEO, Dial Corporation

The Dial Corporation has been a part of the greater Phoenix community for over 30 years. In March 2004, we became a subsidiary of the Henkel Corporation, a global consumer products company with headquarters in Germany. We have actively joined them in support of Henkel's global program of sustainability. Even prior to that, however, Dial had built sustainability into the basic way in which we think and operate as part of our stated "Corporate Vision and Values."

WASTE REDUCTION BY BUSINESSES CAN HAVE A HUGE IMPACT ON SUSTAINABILITY

SOURCES OF U.S. NON-HAZARDOUS WASTE	%
Manufacturing	59
Mining	16
Oil/Gas	13
Agricultural	9
Municipal Solid Waste	2
Other	1

Source: Morrison Institute for Public Policy, ASU; data from Tufts University, *Tufts Recycles*.

From a product development perspective, sustainability is meeting today's consumer needs for household, laundry, and personal care products while sustaining the environment for future generations. We see growing consumer interest and activism for products and packages that are good for them and good for the earth. Sustainability also means employing manufacturing and supply systems that optimize efficient use of resources throughout the supply chain. With our focus on sustainable practices, we have

been able to reduce the cost of our products, packaging, manufacturing, and supply chain, and then pass those savings on to our customers.

Simply stated, sustaining our resources makes good business sense. This is underscored by the fact that our largest trading partner, Wal-Mart, has recently taken a very proactive and visionary approach by making sustainable practices a key criterion for their vendors and manufacturers. As a result, sustainability is not just a nice-to-have, but a business imperative for Dial. Significantly, our R&D strategy includes three key components that relate to sustainability:

■ **ABILITY TO RECYCLE** – We currently utilize liquid laundry detergent bottles that are composed of over 25% recycled resin, bar soap cartons that use 90% recycled fiber, and personal care body wash bottles that are 100% recyclable.

■ **SOURCE REDUCTION** – We have developed a concentrated version of our Purex liquid laundry detergent that requires a bottle only half the previous size, which means we use less plastic in the bottle, less paperboard in the shipping case, less fuel per bottle to ship the detergent, and less energy to manufacture. In addition, the compact container is easier and safer for consumers to store and easier to grip and dispense.

■ **USE OF RENEWABLE MATERIALS** – In our translucent body wash bottles, we have substituted calcium carbonate, a renewable resource, for a portion of the plastic resin. This reduces the use of plastic while maintaining the bottle's ability to be 100% recyclable.

In Dial's move toward more sustainable consumer-packaged goods, we have encountered one noteworthy obstacle – limited availability of recycled materials, especially plastics. While all plastics are potentially recyclable, only two types of containers (HDPE and PET) have been collected, sorted, and recycled to a significant degree. Thus, communities are only taking partial advantage of the recycling opportunities that exist. With the large and geographically compact industrial and consumer base we have in the Phoenix metro area, we should be able to develop a self-sustaining recycling, composting, and even incineration infrastructure. I encourage Arizona business leaders and environmental scientists to build greater sustainability into future regional development plans.

Prior to joining Dial Corporation in 2000, Brad Casper served as a division president at Church & Dwight and spent 16 years at Procter & Gamble where he was a vice president.

ARIZONANS ANNUALLY GENERATE NEARLY ONE TON OF WASTE FOR EVERY PERSON

	MUNICIPAL SOLID WASTE GENERATED (TONS/YEAR)	MSW GENERATED PER CAPITA (TONS/PERSON)	% RECYCLED
Arizona	5,195,330	.9	19.7
U.S.	387,855,461	1.3	28.5

Source: Morrison Institute for Public Policy, ASU; data from *Governing Sourcebook*, 2006.

"With the large and geographically compact industrial and consumer base we have in the Phoenix metro area, we should be able to develop a self-sustaining recycling, composting, and even incineration infrastructure."

Arizona Ranches Plan to Protect Land and Adapt to a Changing Economy

Mandy Roberts Metzger, President, Diablo Trust

Two independent working Arizona ranches – the Bar T Bar and the Flying M – comprise what is known as the Diablo Trust. Located in northern Arizona 160 miles northeast of Phoenix, the boundaries of Diablo Trust encompass 426,000 acres of intermingled private, state, and federal lands. The ranches have protected open space and recreational opportunities for five generations.

Ranches, however, are increasingly threatened by global competition and incentives to convert to subdivisions. To address sustainability of the Bar T Bar and Flying M, two ranch families joined with a group of Flagstaff environmentalists and state and federal agency personnel to create the Diablo Trust in 1993. Today, Diablo Trust is one of the West's oldest and largest grassroots collaborative land management teams.

What is the advantage to Arizona for sustaining these ranches? Summer rainfall and winter snow feed clean water through Diablo Trust rangelands. The moisture creates a diverse plant community that supports wildlife, healthy watersheds, and food production. Wildlife and livestock seasonally rotate between higher and lower elevations allowing the land rest time to build next year's forage. It is a beautiful and productive place.

In contrast, Maricopa County has grown an average of 313 people a day since 2000. Americans, for the first time, import more food than they grow at home. Deserts and high plains are continually devoured by new development. Water supplies have been endangered by growth and the neglect of watersheds.

Benjamin Franklin once said, "When the well's dry, we know the worth of water." The same can be said of open space. With many places seeming to abandon any notion of sustainability, Diablo Trust partners feel the responsibility to become a leader in building sustainable rural economies. Their first task has been to

create a workable long-term plan to guide land use. This has not been historically supported in rural areas.

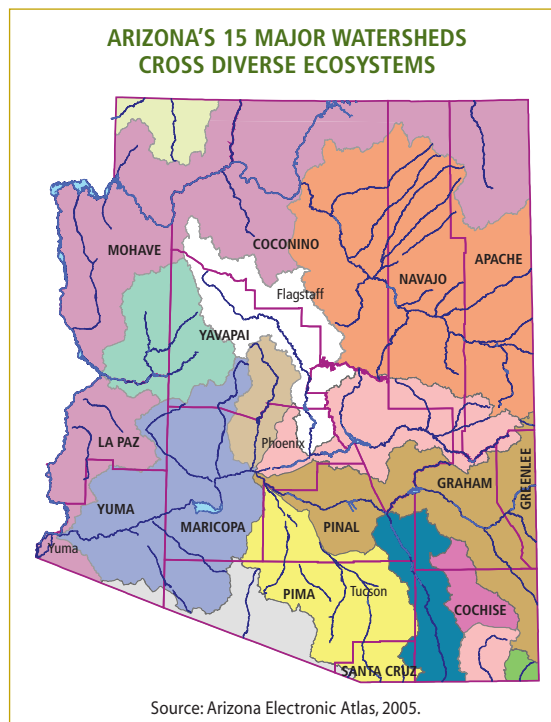
Fortunately, Coconino County leaders have long thought "outside the box" when it comes to rural land use planning. They first began fostering community-generated plans to guide development of unincorporated population centers. More recently, they authorized one of Arizona's first rural plans to guide county actions in places where no population centers exist. This was the Diablo Canyon Rural Planning Area. The resulting plan completed by Trust participants and collaborators in 2005 provides a toolkit and pathway for finding grazing-compatible economic opportunities that will keep the ranches operating into the next generation and beyond.

Among the conclusions of the plan: Trust lands can be used to supply substantial amounts of alternative energy – wind, solar, and biomass. Native seeds can be marketed sustainably alongside local beef. The restoration of 75,000 grassland acres can create opportunities for

research and watershed management. Open space, as well as historical and archaeological sites, can be preserved by employing transfer of development rights, directed development, and conservation easements. Most important, the county and Diablo Trust can continue to work together to preserve sustainable open space. Around the planet, billions of acres exist that are similar to the American West in geology, topography, soils, habitats, watersheds, and food and fiber production. The Diablo Trust experience will provide a hands-on laboratory for new ways to address sustainability in many of these places.

This is a hopeful effort, filled with promise.

Mandy Roberts Metzger has worked as a senior natural resource policy advisor in Washington, D.C., and currently serves on the Arizona Growing Smarter Oversight Council, the Arizona Water Institute Advisory Board, and the board of the Coconino County Sustainable Economic Development Initiative.



"Ranches are increasingly threatened by global competition and incentives to convert to subdivisions. To sustain the Bar T Bar and Flying M, two ranch families joined with Flagstaff environmentalists and state and federal agencies to create the Diablo Trust."

Green Building: Could Home Builders Be Missing the Boat?

Brent E. Herrington, Vice President, DMB Associates Inc.

Like it or not, most home builders consider sustainability just another buzzword. Magazine articles may talk about green building; industry conferences may offer sustainable development seminars; and experts may proclaim the greening of America a major new trend. In truth, however, most home builders I've talked to believe the experts are wrong – that most consumers don't care a whit.

Feedback from the market tells home builders that consumers remain mostly indifferent to environmental concerns. The demand for new housing at the edges of major metropolitan areas seems endless while citizens' groups fight off attempts to increase density in existing neighborhoods. Home builders offering energy-saving upgrades for new homes find few takers. Buyers pass on options like energy-efficient windows, geothermal heat pumps, upgraded insulating technology, and solar panels. Instead, they choose fancier countertops, professional-grade appliances, nicer flooring, heated spas, and designer closet systems. It's like trying to sell spinach in a candy store.

Until the recent run-up in gasoline prices, car makers couldn't keep up with demand for gas-guzzling SUVs; global warming concerns went out the window if they meant a four-cylinder engine. Even when municipalities launch recycling programs, most citizens do a deplorable job sorting their trash. A few years ago, a high-profile new Tucson housing development trumpeted itself as a green community. It was – briefly – the darling of academia and a shining example of progressive urban planning. But consumers yawned, sales slowed, and the project was generally viewed as a flop.

It's easy to understand why home builders question the depth of consumers' commitment to "living green." But could builders be missing the boat?

Despite all of the above, there is compelling anecdotal evidence that a new green movement is breaking like a wave and that consumers are finally truly ready to pay for things that make a difference to the environment. Examples include:

- The sudden and remarkable popularity of hybrid-engine automobiles and the collapsing market for SUVs (starting before \$3 gas prices)

FAST GROWTH AND AFFORDABILITY HAVE FUELED ARIZONA'S HOUSING INDUSTRY

PERMIT	2005	2006	2007*	2008*
Arizona Residential	85,835	66,062	57,005	62,635
% change	0.1	-23.0	-13.7	9.9
Tucson Residential	11,913	8,989	8,092	9,272
% change	14.4	-24.5	-10.0	14.6
Phoenix Residential	62,617	43,610	38,539	42,205
% change	-4.0	-30.4	-11.6	9.5

* Forecast.

Source: *Outlook 2007-2008*, Economic and Business Research Center, Eller College of Management, The University of Arizona.

- The proliferation of organic grocers, such as Whole Foods Market and others, and consumers' demonstrated willingness to pay more for organically grown produce
- The increasing popularity of building materials produced using sustainable methods
- Consumer research indicating a markedly stronger environmental ethos in Generation Y, which includes people now entering the housing market
- Intensified efforts at all levels of government to foster energy conservation, renewable energy technologies, and alternative fuel sources

And lest we forget, there are numerous past examples of sudden, dramatic shifts in consumers' spending priorities. Look no further than the revolutions created by the Internet, cellular telecommunications, or automated banking. Bottom line: Home builders have valid reasons for skepticism, but they should take a fresh look at the subject of sustainability and green building and consider whether we are, in fact, at the beginning of another consumer revolution. Catching the leading edge of such a wave could provide a powerful advantage in a highly competitive industry. It could also help a successful company build a legacy based on caring, sound values, and social responsibility.

Brent Herrington is certified as a professional community association manager and is co-author of the book, *Building Community: Proven Strategies for Turning Homeowners into Neighbors*.

"Home builders offering energy-saving upgrades for new homes find few takers."

Historic Federal Water Plan Concentrated Urban Settlement and Protected Open Space in Arizona

Bruce Babbitt, Former Governor of Arizona, 1978-1987 and U.S. Secretary of the Interior, 1993-2001

It may come as something of a surprise to learn there is such a thing as “federal land use planning.” The notion that land use is a local matter has come to dominate the political rhetoric of our age, obscuring the historical reality that the national government has been involved in land use planning since the early days of the republic. In fact, there is, by whatever name, a considerable body of law that can and, in my view, should be used toward enhanced federal leadership in land use planning and preservation...

To develop water in [Arizona], the Bureau [of Reclamation] first had to decide where the water was to be used on the land, which meant

it had to create the equivalent of a state land use plan, setting in place development patterns that persist to this day.

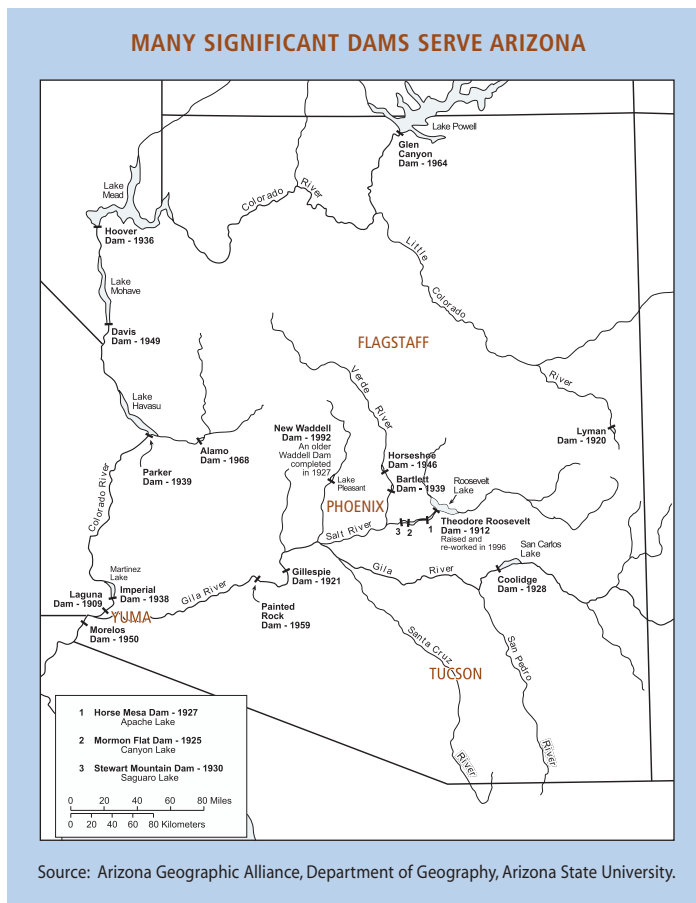
In 1908 the Bureau initiated construction of Roosevelt Dam on the Salt River upstream and northeast of Phoenix. And it eventually followed with five more dams, built on the rivers that drain the highlands of northern and eastern Arizona, in the process appropriating the surface waters of the uplands for the benefit of one downstream region. Phoenix and the surrounding farmland, occupied by fewer than 10,000 residents in 1910, had been preemptively awarded the water resources of half the state, thereby assuring that it would become the urban center of Arizona. Today this early, federal-planned community is a metropolis of more than 3½ million, with more than 60% of the state’s population.

Through its water decisions, the Bureau of Reclamation thus determined where future growth would occur and where, for lack of water, it could not occur on a large scale. Scores of small upstream communities, denied the use of nearby rivers, were consigned to a lesser future, looking on as their water flowed downstream into federal reservoirs built for the benefit of Phoenix and central Arizona.

Yet, by concentrating the water resources essential to development in a few selected places, federal planners and their state counterparts created an oasis model of development, consisting of a few well-watered centers surrounded by miles and miles of desert ranges and open upland forest. While the oasis itself hardly proved to be a model of urban planning, the grand, uncluttered surrounding expanses of desert and mountain are testimony to an effective regional landscape protection plan, the largely unintended result of federal water allocation policies.

A Flagstaff native, Bruce Babbitt worked for passage of the landmark Arizona Groundwater Management Act of 1980 and helped create both the Department of Water Resources and Department of Environmental Quality while governor of Arizona.

Reprinted with permission from *Cities in the Wilderness: A New Vision of Land Use in America*.



“To develop water in [Arizona], the Bureau [of Reclamation] first had to decide where the water was to be used on the land, setting in place development patterns that persist to this day.”

New Degree Program Will Educate a Sustainability Workforce

Charles L. Redman, Director, School of Sustainability, Arizona State University

In 2007, ASU undergraduate and graduate students were able to embark upon a unique educational odyssey. ASU's new School of Sustainability opened as the academic arm of the Global Institute of Sustainability (GIOS), where it will engage students in new academic and research programs that embody collaborative learning, interdisciplinary approaches, and problem-oriented training. Faculty members from across the university have been engaged in developing the sustainability research program and incorporating it into the curriculum. With the start of the first graduate courses in January 2007, and the first class entering in August 2007, ASU has undertaken the most comprehensive approach to sustainability at any university in this country and perhaps the world. The students will have the chance to become our future leaders in creating sustainable solutions to the challenges of our environmental, economic, and societal needs.

A number of global trends show that a changing set of external and internal conditions are confronting local and national decision-makers. Climate change, loss of biodiversity, increasing urbanization of the world's populations, insufficient water resources, growing disparities in wealth, and integration of the world's markets all pose challenges and opportunities for local communities.

These conditions call for a new kind of study program – research and training that is thematic rather than discipline based, and integrative

Given the scale of these challenges, perhaps our greatest need is a drastic increase in the number of people who understand them, accept them, and dedicate their efforts to addressing them.

Alan AtKisson, *The Natural Advantage of Nations: Business Opportunities, Innovation and Governance in the 21st Century*

rather than reductive. It requires a new transdisciplinary academic program that builds upon skills from numerous discipline-based studies and enables students to: 1) address the linkages between people and their social and natural environments; 2) understand and respond to the feedback in a rapidly changing system; and 3) utilize knowledge from all sectors of academia and society to make decisions that do not constrain present and future generations from meeting unforeseen challenges.

Arizona is a logical place to lead the nation in addressing sustainability. ASU is deeply embedded in the Phoenix metropolitan community and is creating knowledge and use-inspired research to address time sensitive issues that affect rapidly urbanizing areas throughout the world, such as urban heat island effects, health threatening pollution, limited water and energy supplies, need for sustainable materials, and urban planning that responds to the needs of all of its citizens. The entrepreneurial spirit of Phoenix supports close collaboration among university, government, and industry players – all of which are seeking novel and effective solutions to the problems of a rapidly urbanizing world.



Charles Redman is an anthropologist and author of 10 books including *The Archaeology of Global Change: The Impact of Humans on Their Environment*.

ARIZONA'S SUSTAINABILITY WORKFORCE WILL DRAW IN PART ON SCIENCE AND ENGINEERING GRADUATES

MEASURE	ARIZONA	U.S.	RANK*
Science/Engineering Doctorates Awarded, 2002	417	24,558	19
Science/Engineering Graduate Students in Doctorate-Granting Institutions, 2002	7,909	482,211	20

*Among 50 states, District of Columbia, and Puerto Rico.

Source: Morrison Institute for Public Policy, ASU; data from National Science Foundation.

"ASU has undertaken the most comprehensive approach to sustainability at any university in this country and perhaps the world."

Using Local Foods Is a Key to Sustainability

Barbara Kingsolver, Author, National Humanities Medalist

Most Americans are entangled in a car dependency not of our own making, but nobody has to eat foods out of season from Rio de Janeiro. It's a decision we remake daily, and an unnecessary kind of consumption that I decided some time ago to try to expunge from my life. I had a head start because I grew up among farmers and have found since then that you can't take the country out of the girl. Wherever I've lived, I've gardened, even when the only dirt I owned was a planter box on an apartment balcony. I've grown food through good times and bad, busy and slow, richer and poorer – especially poorer. When people protest that gardening is an expensive hobby, I suggest they go through their garden catalogs and throw out the ones that offer footwear and sundials. Seeds cost pennies apiece or less. For years I've grown much of what my family eats and tried to attend to the sources of the rest. As I began to understand the energy crime of food transportation, I tried to attend even harder, eliminating any foods grown on the dark side of the moon. I began asking after the processes that brought each item to my door: what people had worked where, for slave wages and with deadly pesticides; what places had been deforested; what species were being driven extinct for my cup of coffee or banana bread. It doesn't taste so good when you think about what died going into it...

We can hardly choose not to eat, but we have to choose how, and our choices can have astounding consequences. Consider this: The average food item set before a U.S. consumer traveled 1,300 miles to get there. If Mr. Average eats 10 or so items a day (and most of us eat more), in a year's time his food will have conquered 5 million miles by land, sea, and air. Picture a truck loaded with apples and oranges and iceberg lettuce rumbling to the moon and back 10 times

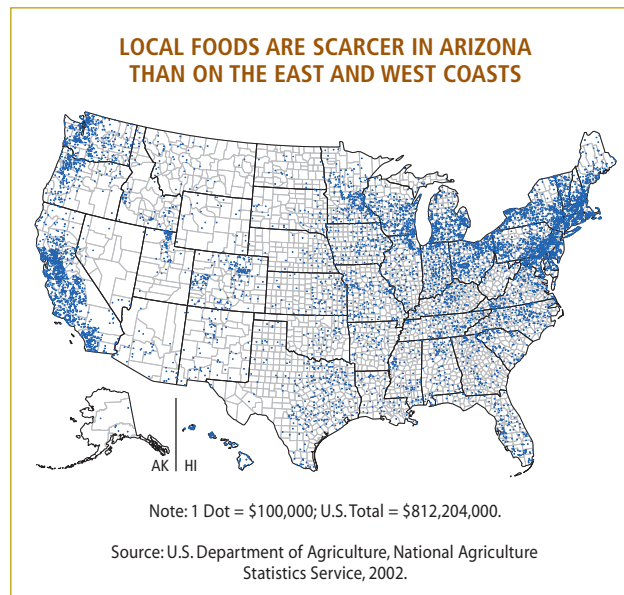
a year, all just for you. Multiply that by the number of Americans who like to eat – picture that flotilla of 285 million trucks on their way to the moon – and tell me you don't think it's time to revise this scenario.

Obviously, if you live in Manhattan, your child can't [raise] chickens. But I'll wager you're within walking distance of a farmer's market where you can make the acquaintance of some farmers and buy what's in season. (I have friends in Manhattan who actually garden – on rooftops, and in neighborhood community plots.) In recent years, nearly 3,000 green markets have sprung up across the country, giving more than 100,000 farmers a place to sell their freshly harvested, usually organic produce to a regular customer base. In some 700 communities, both rural and urban (including inner-city New York), thousands of Americans are supporting their local food economies by signing up with Community-Supported Agriculture, a system that lets farmers get paid at planting time for produce that they then deliver weekly to their subscribers until year's end. Thousands of other communities have good co-operatives that specialize at least in organic goods, if not local ones, and promote commodities (such as bulk

flours, cereals, oils, and spices) that minimize energy costs for packaging and shipping. Wherever you are, if you have a grocery store, you'll find something in there that is in season and hasn't spent half its life in a boxcar. The way to find out is to ask. If every U.S. consumer would earmark just \$10 a month for local items, the consequences would be huge.

Barbara Kingsolver studied ecology and evolutionary biology at the University of Arizona. She now lives in Virginia, the setting of her most recent book – *Animal, Vegetable, Miracle* – in which she documents her family's year-long effort to eat only locally grown food.

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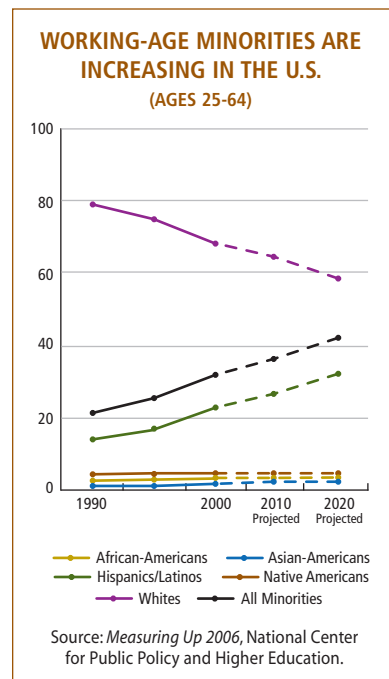
"We can hardly choose not to eat, but we have to choose how, and our choices can have astounding consequences...If every U.S. consumer would earmark just \$10 a month for local items, the consequences would be huge."

Schools Can Capitalize on the “Disadvantages of Success” for the Next Generation of Workers

Kent Paredes Scribner, Superintendent, Isaac School District

As an educator of inner-city students, I have observed that the success of a city follows the success of its urban schools. In Arizona, moreover, the success of the state follows that of its urban centers. Therefore, if we are to compete in the global economy, Arizona must create and sustain urban schools that produce capable, responsible, and well-educated graduates. The success or failure of our urban schools will define the future of our state.

Arizona’s urban school population is growing. The fastest rising segment of that student population is Latino. For many of them, English is not the only language they speak and their cultural experiences differ from those of mainstream America. They must also overcome great obstacles in order to attend school regularly and be ready to learn. Such students are often labeled as disadvantaged compared to other student groups in Arizona. We should question these labels. Are students disadvantaged because they speak a language other than English, understand a culture other than that of mainstream America, and have learned to overcome great obstacles in order to get to school every day?



People who succeed under these circumstances are actually in high demand. They have the characteristics that Fortune 500 companies seek. We have repeatedly been told that companies competing globally actively recruit employees who are bilingual, bicultural, and resilient. In other words, students attending schools in Arizona’s inner-city neighborhoods already have many “disadvantages of success” that can provide them a competitive edge in the global economy. Accordingly,

SOME GAPS ARE EVIDENT IN EDUCATIONAL LEVELS OF WORKING-AGE POPULATIONS, 2000 (AGES 25-64)

	WHITES	HISPANICS/LATINOS
Less than a high school credential	8%	45%
Associate’s degree or higher	39%	13%

Source: *Measuring Up 2006*, National Center for Public Policy and Higher Education.

our educational leaders must create learning environments to help inner-city youth achieve high academic standards and leverage their strengths.

With this idea in mind, Isaac School District reframed its instructional world-view in 2003 to ensure that students attain academic success and become well prepared to compete in the global economy. Parent groups, students, teachers, administrators, and community leaders worked together to reduce our mission statement from a rambling paragraph to three simple goals known as the Isaac Initiatives. The goals are: Increase Student Achievement, Improve Customer Service, and Integrate Parents and Community.

The Isaac Initiatives have guided the redesign of our instruction. Today we create a balance between teaching about English and teaching in English, and our teachers understand the role language plays in serving our linguistically and culturally diverse students. As a result, our students have achieved significant improvements in reading, writing, and math proficiency at each grade level throughout our entire district. In 2003, according to the Arizona Department of Education, we had six “Underperforming” schools. Today, eight of our schools are labeled “Performing-Plus” despite the fact that 93% of our students live at or below the federal poverty line, 94% are of Hispanic/Latino descent, and over 70% come from homes where Spanish is the primary language. With these results, we are convinced our children do have all the disadvantages of success.

Kent Paredes Scribner started teaching in a bilingual Philadelphia-area high school and has worked in administration at both the Tempe and Roosevelt districts. Isaac is a growing K-8 school district of approximately 9000 students in 13 schools covering 6.8 square miles in west Phoenix.

“Are urban students disadvantaged because they speak a language other than English, understand a culture other than mainstream America, and have learned to overcome great obstacles in order to get to school everyday?”

Arizona Can Be Sustainability's Test Bed

Jonathan Fink, The Julie A. Wrigley Director, Global Institute of Sustainability and University Sustainability Officer, Office of the President, Arizona State University

The word "sustainability" has come to mean different things to different audiences. Environmentalists tend to view sustainability in terms of habitat and species preservation, while many businesses think of it as either a set of obstacles to be overcome or as an opportunity to market "green." Another point of view comes from the organizations that are concerned with social welfare and want to assure the largest number of people attain a decent quality of life.

Yet, the whole point of sustainability is to find the sweet spot that balances environmental, economic, and social values. While this seems straightforward, in practice it can be exceedingly challenging. Not only is it difficult to optimize solutions that satisfy all three groups, but even finding agreement on a common vocabulary can be daunting. Nevertheless, a new discipline of sustainability science is emerging that attempts to evaluate all of these different parameters, and do so systematically and simultaneously.

What does all of this have to do with Arizona? Nearly all future population increases will take place in existing or yet-to-be-created cities. Figuring out how these cities can expand economically while avoiding unsupportable stresses on the ecosystem and social fabric is one of the most important challenges the world faces. The region where these things are being most aggressively studied is metropolitan Phoenix.

Here in Phoenix, we have the country's largest number of federally funded research programs designed to help us understand how cities can grow sustainably. Problems under examination include the pace and extent of conversion from agricultural to residential land use; ways that paving the desert increases nighttime temperatures and changes the frequency and intensity of summer thunderstorms; how different kinds of landscaping affect the nature of neighborly inter-

actions; the sources, sinks, and movement of metropolitan air pollution; availability and quality of groundwater today and into the future; and different ways that policymakers evaluate options for the future.

What is unique about our urban research agenda is that it was established from the outset by partnerships of academic researchers with government and private sector leadership groups that came to trust and value each other's perspectives. This way of organizing increases the likelihood that the results of the research projects will be used by the stakeholders, rather than gather dust on somebody's shelf. As a consequence, municipal, state, federal, and business leaders are now supporting work carried out across the university, while academic experts in fields as diverse as economics, geography, recreation management, computer science, architecture, ecology, and environmental engineering are producing new modeling tools to help address problems of rapid urban growth.

One of the most exciting aspects of this research is that the findings can be applied elsewhere. Rapidly growing places can learn from each other about how best to design sustainable cities from scratch. The same pressures we face in Arizona – immigration, urban heat island, limited water supply, and vulnerability to energy disruption – are problems that millions of the world's urban dwellers either confront now or will soon. Arizona's fast-growing cities are uniquely poised to become the test beds where sustainable solutions for urban systems can be created. Exporting these new ideas and their associated technologies will benefit everyone.

Jonathan Fink is a volcano specialist with faculty appointments in both the School of Sustainability and the School of Earth and Space Exploration. He formerly held the post of Vice President for Research and Economic Affairs at ASU.

ASU RESEARCH TARGETS USEFUL APPLICATIONS LOCALLY AND GLOBALLY

SUSTAINABILITY ISSUES	ASU RESEARCH RESPONSES	SELECTED RESULTS
Water Supply	Decision Center for a Desert City	• Calculated water demand increase for heat island effect
Heat Island Effect	ASU Center of Excellence	• New "cool" concrete pavement
Air Pollution	Phoenix Air Flow Experiments	• Illustrated flow of air pollutants in metro Phoenix
Housing Affordability	Stardust Center for Affordable Homes	• Built Guadalupe House, a sustainable, affordable housing prototype

Source: Morrison Institute for Public Policy, ASU.

"What is unique about our urban research agenda is that it was established by partnerships of academic researchers with government and private sector groups that came to trust and value each other's perspectives."

Phoenix Quality of Life and Amenities Make Sustainability Achievable

Phil Gordon, Mayor, City of Phoenix

Phoenix is the fifth-largest city in the United States, and it continues to grow because of its tremendous quality of life – its “livability.” Two decades from now, however, the measure of a great city will be determined by how well it sustains its livability. That’s why city leaders want Phoenix to be “Number One” in sustainability.

We have a sound foundation to build on. Phoenix is already recognized for many good things. The city offers an impressive array of options for education and jobs, arts and culture, sports, and leisure activities. We have established expansive mountain and desert preserves, an abundant water supply, and one of the largest municipal alternative-fuel fleets in the nation. Public and private sector investments have built facilities to the standards of the LEED (Leadership in Energy and Environmental Design) rating system of the U.S. Green Building Council, such as the Phoenix Fire Station 50, Desert Broom Library, USAA Phoenix Campus, and the DLR Group Office. Phoenix voters have consistently passed comprehensive bond packages to make significant investments in their city’s future, ranging from the Arizona Science Center and Phoenix Art Museum to libraries, parks, and senior centers citywide to a new ASU downtown campus. Voters also authorized the light rail system currently under construction, which will be powered by electricity and promises to take thousands of cars off the streets.

While past Arizona visionaries created the first generation of sustainability by bringing water and energy to Phoenix, current city leaders must now focus their efforts to ensure these resources are available to the next generation. We are doing our part. Councilman Claude Mattox, chairman of the

Land Use, Environment and Natural Resources Subcommittee, helps lead our efforts to maximize use of reclaimed water to irrigate new city parks and golf courses, restore wetlands, and recharge aquifers for future use. Councilman Doug Lingner’s leadership of the Sustainability Subcommittee helps strengthen our current efforts in clean fuels, green buildings, and renewable energy-producing technologies. The entire City Council and I are setting policy to address the heat island effect and shade.

To me, “sustainability” and “livability” are interchangeable because our goal is to make Phoenix a place where people not only can, but want to live. What is my personal interest in livability? I’m the father of four. I want the same thing for my children that my parents wanted for me when they moved to Phoenix in 1960 – a city that will offer an even better quality of life and even more opportunities for future generations.

Phoenix city leaders believe that we can exhibit our greatest potential for livability in the present, while also focusing on ideals of smart-growth development that are environmentally sensitive, economically viable, community-oriented, and sustainable for the future. We believe the opportunities are endless for making Phoenix Number One in livability. Why pursue this goal? Because it is the right thing

to do for our children and the generations to come.

Phil Gordon has taught school, worked as chairman of Landiscor aerial photography company, served two terms on the Phoenix City Council, and was elected mayor of Phoenix in 2003.

Photo information: Dreamy Draw Pedestrian Bridge/Paradise Valley Gateway, design and photo by Vicki Scuri SiteWorks for City of Phoenix.



“Phoenix city leaders believe we can exhibit our greatest potential for livability in the present, while also focusing on ideals of smart-growth development that are environmentally sensitive, economically viable, community-oriented, and sustainable for the future.”

Eco-Industrial Park Will Position Coconino County as a Sustainability Center

Stephanie McKinney, Former President and CEO, Greater Flagstaff Economic Council

Greater Flagstaff Economic Council (GFEC) has been an important economic development agency in Northern Arizona since 1992. Working hand-in-hand with Coconino County's sustainable economic development initiative, GFEC has targeted specific industries that add to the economic base of the community, offer high paying jobs for workers, and maintain sustainability of our area. Among the companies we worked to attract to the region are those in the biosciences and medical devices, renewable and sustainable resources, and technology.

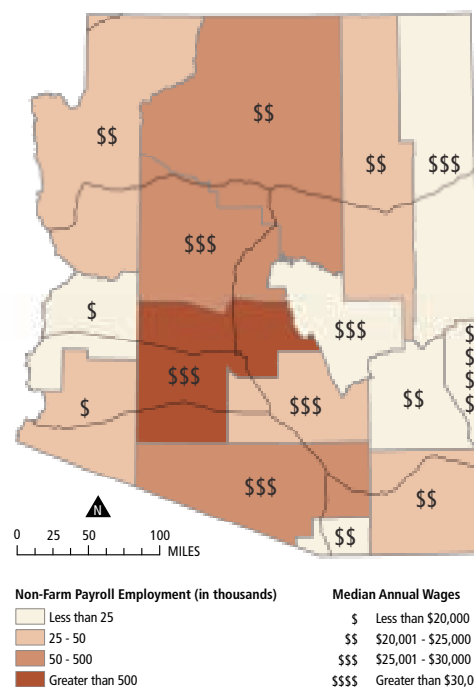
Flagstaff should be an easy sell for relocating companies because it is repeatedly recognized by national organizations as one of the best places to live in the country, and it has outstanding transportation infrastructure for a city of its size. But a lack of suitable land for development in the Flagstaff area has hampered business startup, expansion, and relocation.

Recently, however, a solution has emerged out of a collaborative effort involving GFEC, U.S. Army Corps of Engineers, and Arizona National Guard. These organizations worked together to propose an "Eco-Industrial Park" on over 800 acres of federal land at the National Guard's Camp Navajo training site 12 miles west of Flagstaff. This land has been made available for commercial private development under the army's Enhanced Use Leasing program. Already, Federal Development Group has been designated the developer for the project, and plans are underway. The park is expected to become home to a variety of "green industry" companies including a small-diameter wood-based products campus and a bio-mass power generating facility, and it will house low-impact warehouse and freight facilities. All of these operations are expected to pay higher than average wages for members of the local community.

With its Eco-Industrial Park in place, Northern Arizona will be well positioned as a desirable location to do sustainable business with renewable resources. This project is expected to get underway in fall of 2007 with first tenants moving in during summer of 2008.

Stephanie McKinney has served on a variety of boards including the Northern Arizona Bioscience Steering Committee. GFEC ceased operations as an economic development agency in August 2007, but remains as an all-volunteer nonprofit organization monitoring economic development in the Flagstaff area.

ARIZONA EMPLOYMENT INCOME IS UNEVENLY DISTRIBUTED



Source: Morrison Institute for Public Policy, ASU; data from Arizona Department of Economic Security.

ARIZONA'S ECONOMY ALREADY BENEFITS FROM SUSTAINABILITY-ORIENTED COMPANIES

SUSTAINABLE SYSTEMS CATEGORY	TOTAL COMPANIES	TOTAL EMPLOYMENT
Environmental Services and Equipment	628	19,125
Pollution Prevention and Recycling	106	1,223
Renewable Energy	83	818
Energy Efficiency	54	1,462
Green Construction Materials	9	172
High-Value Bioproducts	7	205
Sustainable Agriculture and Forests	47	1,161
Total Count	934	24,166

Source: Battelle Technology Partnership Practice, Arizona Department of Commerce, 2005.

"With its Eco-Industrial Park in place, Northern Arizona will be well positioned as a desirable location to do sustainable business with renewable resources."

Sense of Place Provides a Long-Term Economic Asset for Rural Communities

Allan Affeldt, Mayor, City of Winslow and Owner, La Posada Hotel

Preservation and economic development are often presumed to be natural enemies – that old structures stand in the way of new opportunities. Thus in urban areas, increased density and redevelopment often lead to a loss of streetscape and human scale, and more important, the loss of sense of place. It is now well understood that this loss has many negative consequences; thus, new urbanism attempts to retain (or create) historic facades.

In a rural context, the problems are different. With fewer pressures for redevelopment, historic buildings are more likely to be lost through apathy or lack of investment. This failure can be destructive in a rural community because our sense of identity is typically derived through our historic downtowns.

I moved to Winslow in 1997 to try and save a historic building – La Posada Hotel – one of Arizona’s great architectural treasures. Designed by Mary Jane Coulter, La Posada had been the centerpiece of Winslow’s turn-of-the-century railroad and Route 66 downtown. Like so many rural communities, however, changing traffic and retail patterns (in our case the coming of Interstate 40) led to the closure of La Posada and virtual abandonment of historic downtown to an unsavory collection of bars. Neither local citizens nor tourists would go there because it was unsightly and unsanitary. Thus it was generally assumed La Posada could not be saved. Times had changed and no longer did anyone want to stay in this decaying environment.

But we did renovate and reopen La Posada, and it has demonstrated that historic preservation can be

the centerpiece of a rural economic development strategy. We have already created 40 new jobs for Winslow, more than any other locally owned business in decades. And the hotel is full nearly all the time. In fact, La Posada has become a destination in itself, and in so doing has sparked a renaissance for historic downtown. We have attracted widespread media attention to a community long overlooked, and that has led to increased investment in new and old properties. But there is a bigger story.

Great buildings once gave our communities a sense of pride and of identity. Now the average American family relocates every five years, never puts down roots, and has become increasingly ungrounded. Insofar as we fail to preserve historic places, we become alienated from each other and our towns. I think this is behind the rise in heritage tourism. We need to identify with a place and can only do this through well interpreted historic buildings.

An old building like La Posada holds enormous reserves not only of embodied energy, which would have to be replaced in new construction, but also of embodied ideals and shared memories, which cannot be replaced by new construction. It is a prime example of how preservation of important buildings can be a catalyst for rural economic and community development and may be the essential spark for sustaining our identity and our common heritage.



Allan Affeldt bought and restored one of the country’s last great railway hotels, the La Posada, which won the Governor’s Heritage Preservation Award in 2003 and has been instrumental in the revitalization of downtown Winslow.

Views of lobby corridor (top) and south facade (bottom) of the restored La Posada Hotel, Winslow. Photo Credit: Daniel Lutzick.

“Preservation of important buildings can be a catalyst for rural economic and community development and may be the essential spark for sustaining our identity and our common heritage.”

At its Best, Agriculture Serves the Economy, Communities, and Security

Kevin Rogers, President, Arizona Farm Bureau Federation

An old proverb says you cannot step into the same river twice, and so it is with Arizona agriculture: It's a changing industry that we must determine how to manage for a sustainable future. For this to happen, our farmers, ranchers, dairy, and nursery operations must continue to be ever-more efficient producers. But they also need Arizonans' recognition, understanding, and assistance.

It may surprise some, but the economic impact of Arizona agriculture is on the increase, having risen from \$6.6 billion in 2000 to \$9.2 billion in 2004 for food, fiber, and ornamentals. Diversification, more intensive operations, and vertical integration have propelled this growth. Specialization, increased mechanization, and sophisticated scientific tools have helped increase productivity in both crop and livestock production, and this will continue. Biotechnology and alternative energy production offer further potential for growth.

Arizona farmers and ranchers have learned to compete in a global market where producers make decisions based on non-trade-distorting market signals. But continued government assistance is needed to assure a level playing field, and agricultural products can no longer be the sacrificial lamb for other industries seeking to move their products to export. We need a hand up vis-à-vis trade issues – not a handout from the federal government.

Despite mechanization, the need will also remain for a legal, reliable labor supply – something much discussed yet not properly addressed by the federal government. The reality is that we either import our labor or we will export our food production. It is that simple.

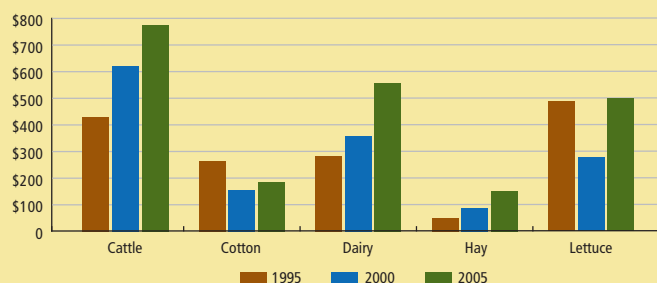
In addition to its economic function, Arizona agriculture plays another significant role in managing natural resources and making our space more livable. Consider, for example, the flexibility agriculture adds to the state when it continues to manage a water resource that might be called upon in an emergency. If agriculture were to disappear, so would this flexibility for urban areas. Such contributions

ARIZONA'S TOP COMMODITIES TOTALED \$2.2 BILLION IN 2005

TOP 5 AGRICULTURAL COMMODITIES AND RECEIPTS

RANKING	COMMODITY	RECEIPTS (MILLIONS)
1.	Cattle	\$774
2.	Dairy	\$556
3.	Lettuce	\$501
4.	Cotton	\$187
5.	Hay	\$152

MAJOR AGRICULTURAL COMMODITIES AND RECEIPTS (IN MILLIONS)



Source: Morrison Institute for Public Policy, ASU; data from U.S. Department of Agriculture.

have yet to be properly considered and valued by the citizens of this state. This discussion must go forth in Arizona for agriculture to be sustainable – otherwise, urbanization rolls on, and in the Southwest this always occurs where the water is or where it can be transported.

Lastly, a lack of commitment to a sustainable agriculture needs to be recognized as a direct threat to our security. Arizona agriculture is part of a highly efficient system that produces the safest and most diversified food supply at the lowest price for any developed society in the world. Our food production is taken for granted by the consumer. Without some attention and thought, however, this security will be outsourced.

Kevin Rogers and his family have farmed cotton, hay, wheat, corn, and barley in the Phoenix area for four generations.

“A lack of commitment to a sustainable agriculture needs to be recognized as a direct threat to our security.”

Education, Health, and Research are Three Investment Imperatives for a Sustainable Arizona

MaryAnn Guerra, President, TGen Accelerators and Chief Business Officer, TGen

Creating a truly sustainable future for Arizona requires continued investment in joint public-private efforts aimed at improving quality of life for all residents. This will not be easy. Such efforts are often tethered to political agendas and special interests that drive policy without understanding the value of integrating major public goals. This ignores the power of unity over adversity.

Arizona must achieve that unity. Recent bioscience initiatives have generated positive momentum across the state, creating a ripple effect that can spur further progress in three crucial areas: education, health, and research. A brief overview of these three foundations of sustainability highlights their importance to achieving long-term success.

■ **EDUCATION** America's school dropout rate is on the rise, driven predominantly by children from low-income families. Other nations, however, are embracing education as a vital component of their economic policies. They understand that, in the new knowledge-based workforce, education – particularly in math and science – is critical to new technology development. We must start immediately to better prepare our youth, beginning with K-12 and ending with advanced and postgraduate education. It works in Ireland, Denmark, and elsewhere. It can work in Arizona too.

■ **HEALTH** As health care costs escalate and our nation grows older, the consequences have filtered down to the everyday economy. Baby boomers are already forced into rethinking careers or taking time off to care for loved ones. Yet, improving health care and lowering extended-care costs are achievable objectives for Arizona. Critical to their success is the investment that we have made – and will make – in educational facilities, research infrastructure, and bioscience expertise. Dr.

George Poste, Director of the Biodesign Institute at Arizona State University, has said: "The more that biotech develops in the Valley, it will bring not only economic benefits but personal ones. Local research tends to reach local patients first."

■ **RESEARCH** America's prominence in science and technology, once reflected in a national infrastructure for the support of research and development, now faces a global challenge.

From 1995 through 2001, China, South Korea, and Taiwan increased gross R&D spending nearly 140%, while U.S. increases totaled only 34%. The number of patent applications for innovations originating in Asia since 1998 increased by 789%, while it rose in the U.S. by only 116%. Failure to prepare and compete will impact our nation's ability to develop new technologies that drive new company formation, future jobs, and economic growth. Arizona, however, has an opportunity to lead the nation in creating a new paradigm for economic sustainability based on advanced research. We are one of the few states with a Bioscience Roadmap and an organized Bioscience Steering Committee.

Professor Gary Pisano, a biotech expert at Harvard Business School, argues that future economic success depends on integration of organizations and functions in a manner he terms "linking the islands of expertise together." Arizona has already begun this process. We have been investing in the three foundations of success through our state and local governments, universities, and business and philanthropic communities. Now we must continue to work together to provide the leadership and critical resources to compete globally.

Prior to joining TGen, MaryAnn Guerra was deputy director for management at the National Cancer Institute, National Institutes of Health.

ARIZONA'S HIGH SCHOOL GRADUATION RATE IS ON A SLOW UPWARD PATH

YEAR	4-YEAR GRADUATION RATE
2000	71.4%
2001	70.8%
2002	72.7%
2003	74.0%
2004	76.8%

Source: Morrison Institute for Public Policy, ASU; data from Arizona Department of Education.

MINORITY GROUPS COMPRISE MORE THAN HALF OF ARIZONA'S K-12 STUDENTS 2005-2006

RACE/ETHNICITY	NUMBER	%
Hispanic	426,642	39
Black	56,863	6
Asian	27,110	3
White	516,118	47
Native American	67,493	6
Total	1,094,226	100*

*Percentages may not total 100 due to rounding.

Source: Morrison Institute for Public Policy, ASU; data from Arizona Department of Education.

"Arizona has an opportunity to lead the nation in creating a new paradigm for economic sustainability based on advanced research."

Public Health Investments in Prevention Are Needed to Balance Forces of the Marketplace

Donald Warne, Clinical Professor, Sandra Day O'Connor, College of Law, Arizona State University

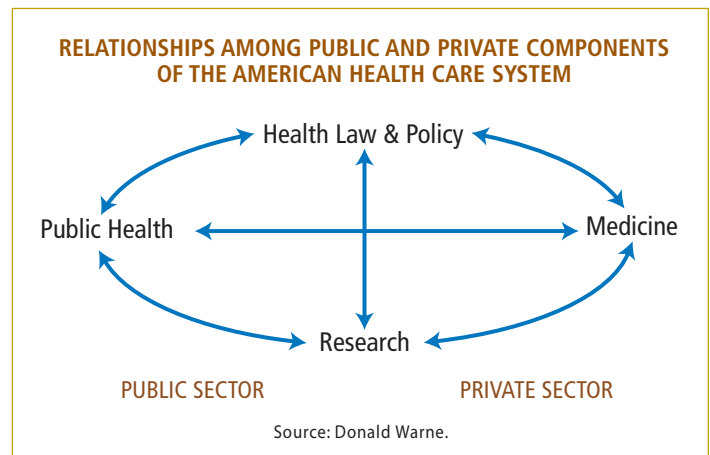
America's health care policy has evolved into a maze of competing agendas, fed by a complex mixture of services and funding streams from both the public and private sectors. In thinking of sustainability in American health care, one must step back and look at the roles for and the agendas of its three major components: public health, medicine, and research. One must also remember that health care is not a legal right in this country. Although as a nation we spend over \$1.5 trillion annually on health care, more than 40 million Americans today live without health insurance.

The first two components of American health care, public health and medicine, play roles that are not only distinct but unfortunately are sometimes in competition. Public health seeks to keep people healthy through health-promotion and disease-prevention activities (smoking cessation/prevention, vaccination, etc.). Medicine's job is treating diseases and injuries after they occur. Public health programs are agency-driven and largely publicly funded, whereas medicine is industry-driven and largely privately funded. The customers who drive the medical industry are people with diseases. We must thus ask: If we successfully prevent diseases like diabetes and heart disease, what will happen to the medical industry?

The third major component of the American health system is research, which is funded by a mixture of public sources (e.g., the National Institutes of Health) and private sources (e.g., the pharmaceutical industry). Research provides data on both the best ways to prevent and treat disease and the best ways to organize health systems. Publicly funded research is largely conducted by investigators at universities and similar institutions, which rarely receive significant financial rewards. Privately funded research, however, can lead to significant financial rewards. This is a strong competing agenda that can have an impact on how research findings are framed.

Each of the three arenas is governed to some extent by health law and policy, and the arenas in turn influence health law and policy through two primary mechanisms: data and money. What this overview suggests is that sustainability in health care cannot be achieved if

private sector market forces are left unbalanced by sufficient public health investment. The system currently allows for the medical arena to have a greater influence on policymakers in terms of data and money. The medical industry is a large contributor to political campaigns and can have an impact on health law and policy development. The only tool available to the public health arena is data. We can show patterns of disease and we can propose solutions to promote health and to prevent disease in our communities, but it is up to policymakers to make the appropriate investments in public health to slow the numbers of people entering the medical system.



In Arizona, our strategy to promote sustainability in health care needs to be focused on appropriate public health investment to prevent diseases and injuries in our communities, and we should hold our policy makers accountable for such outcomes. Ideally, our policymakers will shape our health care system based not on outside agendas or special interests, but on data and science. As individuals, we each have a role in living a healthy lifestyle ourselves; as a community, we should elect lawmakers who genuinely seek to invest in the health of all of us.

A member of the Oglala Lakota tribe, Donald Warne is a medical doctor, has a background in public health, and comes from a long line of traditional healers.

"Sustainability in health care cannot be achieved if private sector market forces are left unbalanced by sufficient public health investment."

Six Challenges Must Be Met for a Sustainable Water Supply

Jim Holway, Associate Director, Global Institute of Sustainability, Arizona State University

Is our current growth and water use sustainable? This frequently voiced concern is a simple question that does not have a simple answer.

First, we have many options on how we choose to use our water. Second, the backdrop against which we view our water supply and use is constantly changing – our population continues to expand, our economy grows, our desires and expectations evolve, and we respond to any number of external events, including new technologies, global climate, and energy availability. Third, sustainability can be defined and measured in different ways with differing results.

Arizona, like most other regions of the world, initially developed through exploiting its natural resources, often at rates that would deplete them over time. A key challenge for sustainability is looking far into the future to anticipate the needs for new resources, technologies, and even human behaviors so we can make adjustments in a timely manner and avoid crossing critical thresholds that could result in unacceptable or irreversible damage to our future sustainability. Groundwater overuse, for example, could dewater an aquifer and result in compaction of the aquifer's underground structure. This could lead to permanent loss of water storage capacity, increased vulnerability to drought, or even land subsidence and

fissuring. All of these have occurred in Arizona.

Managing for sustainability becomes increasingly complex as population growth and lifestyle changes place higher demands on resources. To meet that demand, we must increase our investments in new water resources, physical infrastructure, and social institutions; otherwise we won't be able to maintain our region's ability to respond to changes. One of Arizona's political chal-

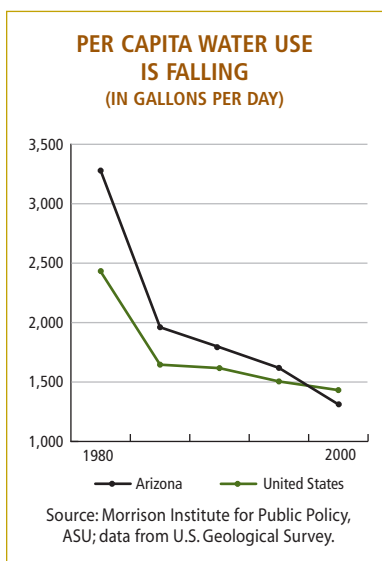
lenges is that many of our leaders miss this fundamental relationship. They want to allow continued growth, but don't want to invest in the tools needed to effectively manage and serve our increasingly complex communities.

Nevertheless, Arizona has made some significant advances in linking water and growth to address long-term sustainability. These include provisions of the 2000 Growing Smarter Act that require a water adequacy element in general and comprehensive plans for most of the larger or faster growing local governments; provisions of House Bill 2277 passed in 2005 that require water supply, drought, and conservation planning by water providers throughout the state; and measures under the 1980 Groundwater Management Act that require state-prepared water management plans for the five Active Management Areas (AMA), as well as a "100 year renewable water supply" before AMA land can be subdivided.

Despite Arizona's water measures, the state still faces several major challenges. I recommend six actions for assuring a sustainable Arizona water supply:

1. Develop long-range water demand projections along with information on supplies throughout the state.
2. Forge regional partnerships to develop coordinated long-range watershed and aquifer management strategies.
3. Secure future supplies.
4. Improve understanding of climatic variability and change.
5. Modify the state's regulatory framework and water management organizations to evolve with continued growth and to ensure adequate protections in rural Arizona.
6. Address environmental quality, ecosystem health, and quality of life concerns as they relate to water management.

Jim Holway is a professor of practice in ASU's Ira A. Fulton School of Engineering and is the ASU coordinator for Arizona Water Institute. He was formerly assistant director of Arizona's Department of Water Resources.



"We must increase our investments in new water resources, physical infrastructure, and social institutions; otherwise we won't be able to maintain our region's ability to respond to changes."

Water Regulation Should Serve Arizona's Waterways and Riparian Areas

Sharon Megdal, Director, Water Resources Research Center, The University of Arizona

Many once lush riparian areas have been lost in Arizona. While the state's much-acclaimed 1980 Groundwater Management Act has considered the needs of the municipal, agricultural, and industrial sectors, the act has not addressed water needs of the environment. We can all see the unfortunate results in dry river beds and dehydrating riparian areas. To reverse this trend toward environmental degradation, a number of agencies, groups, and individuals throughout the state have undertaken projects to revive Arizona's threatened wetlands and riparian areas.

With funding from the U.S. Bureau of Reclamation, we at the WRRRC surveyed 30 restoration projects in Arizona to help understand their scope and function and learn from their experiences.* The projects vary considerably, with each having a unique story. For example, the original Rio Salado Project, an idea to restore riparian habitat along the Salt River in metro Phoenix, was rejected by a public vote in the 1980s, but was more recently resurrected as a series of smaller projects that have enjoyed considerable support. In the Tucson region's Ed Pastor Kino Environmental Restoration Project, an old flood control detention basin was redesigned to create wetlands and provide water storage for irrigation of playing fields. In central Arizona, restoration of spring-fed Fossil Creek was made possible through a decision negotiated with APS to decommission a dam that for nearly a century had diverted water for hydroelectric generation.

In all of the projects, the primary motivation has been to restore riparian habitat. Each one represents an example of barren areas brought back to life, or an area that, without intervention, would deteriorate. Other motivations, however, include flood control,

economic development, and water quality improvements. A significant side benefit associated with many of the projects has been the opportunity to provide environmental education to the public through active or passive education programs. Many also offer recreational benefits to humans.



View of Tres Rios Wetlands, Phoenix. Photo Credit: Donna Paladino.

Some important lessons have been learned from the projects. Major investments of time and money are usually required. Multiple funding partners, including the Arizona Water Protection Fund, are often needed. Public input is vital. And many of the projects in the areas of Phoenix and Tucson required commitments of long-term water supplies, most commonly effluent or storm water. This water is not always easy to find.

In some parts of the world, efforts are underway to quantify the water requirements of the environment so that river functions can be sustainable. In Arizona, much focus has been on water resources of the Verde River and portions of the San

Pedro River. As we think about sustainability for our state's communities, we should consider the importance of the environment to our quality of life and meet its needs as well. This will require reliable financial and water resources. One way to meet these needs is for our legislature and other leaders to clearly recognize the importance of preserving valuable habitat and act to create reliable funding for the Arizona Water Protection Fund.

Sharon Megdal is a professor of agricultural and resource economics and served on the Arizona Corporation Commission from 1985 to 1987.

* Sharon B. Megdal, Kelly M. Lacroix, Andrew Schwartz, *Projects to Enhance Arizona's Environment: An Examination of Their Functions, Water Requirements and Public Benefits*, Water Resources Research Institute, May 2006.

"As we think about sustainability for our state's communities, we should consider the importance of the environment to our quality of life and meet its needs as well. This will require reliable financial and water resources."

Arizona Should Preserve Agriculture as Our Heritage and Water Hedge

Grady Gammage, Jr., Senior Research Fellow, Morrison Institute for Public Policy, Arizona State University

In places like California's Central Valley, preserving agriculture is about protecting America's food supply. In the eastern U.S. it's about saving family farms, small towns, and a quintessentially American way of life. In the Willamette Valley, it's about containing sprawl. But in Arizona, it's about the water.

As an economic sector, Arizona agriculture represents less than 2% of the state's gross product, down from 3% two decades ago. Yet approximately 75% of the consumptive use of fresh water in the state goes to growing crops. Those figures would seem to suggest that eliminating agriculture would head the state in a more sustainable direction.

Arizonans have tended to view agriculture as kind of a holding zone: what you do with property until it is ripe for subdividing. A section of

housing generally requires less water than the same section of land used to grow crops, so as we convert land to residential use, we use less water. Yet agricultural water and urban water are not the same commodity. An essential component of water is its reliability as a resource. Domestic urban water must be especially reliable; it is very difficult to take water away from homes. Agricultural uses, especially for non-food crops, lie at the opposite end of the dependence/demand scale and therefore at the opposite end of the price scale. We sell water to farmers below the cost of getting it here because doing so protects our water supply from others who would claim it.

We are now beginning to face the question of what happens as we convert the remaining agricultural land in central Arizona to urban uses. Left to the free market, agriculture will ultimately disappear as the urban population grows and water flows toward higher-value uses. We should think carefully before allowing that to happen. With abundant land and sunshine, the Hohokam created a civilization because water could be moved and applied to the land. Our civilization "rose from their ashes." Surely sustainability demands some respect for history. The urban heat island is also increasing at an alarming rate. Studies at Arizona State University show that irrigated agriculture fields actually cool off more at night than does the native desert.

Most importantly, agricultural water use is a buffer. In times of shortage, it is relatively simple to tell farmers they cannot plant their crops. That water can then migrate to higher priced and less interruptible urban uses. Part of the reason why the Phoenix area has weathered the western drought with far fewer water restrictions than other cities in the Southwest is that agricultural water has been available to move to urban uses in our time of shortage. If our urban population increases to where it requires the entire available water supply, we lose that safety valve.

Sustainability is about balance, resilience, and preserving options. Preserving agriculture can further those goals.

Grady Gammage, Jr., is a recognized authority on land use regulation, a former president of the Central Arizona Project Board, and an adjunct professor at both ASU's Sandra Day O'Connor College of Law and the ASU College of Architecture and Environmental Design.

AGRICULTURAL LAND AREA IN ARIZONA IS SLOWLY SHRINKING



Source: Arizona Water Atlas, Volume 1, Arizona Department of Water Resources, June 2006.

"The Hohokam created a civilization because water could be moved and applied to the land. Surely sustainability demands some respect for history."

Green Olympics Would Motivate Cleaner, Cheaper, Safer Designs

William C. Clark, Professor of International Science, Public Policy, and Human Development, Harvard University

The Olympic Games, at least in humanity's better years, have been built around a truce that allowed traditional antagonists to join in a common quest for "swifter, higher, stronger" achievements in competitive sport. Might it be time for a similar occasion that would encourage all sides in the sustainable development debate to celebrate the "cleaner, cheaper, safer" accomplishments of the world's foremost proponents of green design?

Green design is every bit as open-ended a category as Olympic sport. But the presence of some dodgy stuff around the edges should not obscure the increasingly high standards of performance on display in the core events. In the case of green design, any list of the most serious competitions would include at least green building, green chemistry, and green engineering.

Green building is perhaps the most visible of today's efforts to advance a sustainability transition through cleaner, cheaper, safer development. Its seemingly mundane accomplishments in passive solar heating, water reuse and recycling, and the use of natural light and landscaping are beginning to transform the footprint of human habitation on the land.

Green chemistry, in contrast, is advancing in ways and places completely invisible to most of us but has consequences that are increasingly profound and far reaching. It has resulted in the increasing substitution of biological for petrochemical feed stocks, elimination from commercially important processes of highly toxic intermediaries such as hydrogen

cyanide and phosgene, and widespread displacement of environmentally problematic organic solvents by water.

Green engineering is the most inclusive of today's cleaner, cheaper, safer movements. Green engineering seeks to reduce the amount of resources consumed or of pollution emitted per unit of useful product or service produced. Efforts to achieve such goals long predate the green label or the rise of environmentalism.

Much remains to be done if the green design movement is to complete the transition from its fragmented amateur beginnings to the unified, professionalized activity it is beginning to become today. Among the principal challenges are devising appropriate metrics to distinguish superb performers from the merely accomplished; adjusting outmoded regulations that unnecessarily impede progress; and, above all, designing more appropriate programs of training, nurturing, and recognition for the rising generation of scientists and engineers on whom the future for a cleaner, cheaper, safer world depends. What better call than for a Green Olympics?

MacArthur prize winner William C. Clark is a member of the U.S. National Academy of Sciences and co-chaired the 1999 U.S. National Research Council study, *Our Common Journey: A Transition Toward Sustainability*. He currently chairs the design committee for the Heinz Center's State of the Nation's Ecosystems Project.

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LEED CERTIFIED PROJECTS ARE LOCATED THROUGHOUT ARIZONA

SELECTED PROJECTS	CITY	LEED RATING
Apache Junction City Hall	Apache Junction	Certified
Chino Valley Agribusiness and Science Tech Center, Yavapai College	Chino Valley	Silver
Desert Edge High School, Phase 2, Aqua Fria Union High School District	Goodyear	Silver
Drury Inn & Suites	Flagstaff	Registered
South Rim Maintenance & Warehouse Facility	Grand Canyon	Certified
Amtrust Bank	Maricopa	Registered
Physical Sciences Building, Mesa Community College	Mesa	Registered
DLR Group Office	Phoenix	Certified
Desert View Public Library	Phoenix	Certified
San Carlos Alternative Rural Healthcare	Peridot	Registered
Institute of EcoTourism	Sedona	Gold
Roosevelt Facility, General Dynamics	Scottsdale	Certified
Scottsdale Senior Center at Granite Reef	Scottsdale	Gold
ASU Biodesign Institute, Phase 2	Tempe	Platinum
North Central Association	Tempe	Gold
Desert Vista Campus Campus Fitness & Sports Science Building, Pima Community College	Tucson	Silver
Wide Ruins Community School	Wide Ruins	Registered

Source: Morrison Institute for Public Policy, ASU; data from U.S. Green Building Council, 2007.

"Much remains to be done if the green design movement is to complete the transition from its fragmented amateur beginnings to the unified, professionalized activity it is beginning to become today."

Sustainability Thinking Starts at Home

James Buizer, Executive Director, Strategic Institutional Advancement, Arizona State University

I find the notion of implementing sustainability far more difficult to wrap my mind around than defining it. The idea of a balanced, sustainable global economy that protects the natural environment and is equitable to all is simply overwhelming. However, when I think of how I would apply sustainability principles to my immediate world – my family – I find the concept really quite straightforward. It involves balancing personal choices with personal limits to achieve the best possible results.

What this means in practice is that every time I make a decision that affects my family's quality of life – our economic situation, our home environment, or our social and cultural development – my personal values and limitations come into play. These decisions are not as complex as they may sometimes seem. We do it all the time. In making a decision I am unconsciously asking three questions about the sustainability of my choice: What to sustain, for how long, and who gets to decide? These are some of the most challenging questions on a global scale, but at the personal level they are quite answerable.

What aspects of my life do I want to sustain? Mainly it is those things in which I am vested – my family, our lifestyle, our living space. Living space includes the natural environment in which my home is situated and, most often, that of the surrounding community as well. It also includes the economic, social, and cultural environments we encounter

on a regular basis. I am less likely to invest in the sustainability of a system I never see.

How long is the outlook? Today, I am most interested in what happens over my children's lifetimes. They are 11 and 14, so I often think about the future I am creating for them. I suspect my timeline will change as life moves forward. Today, for example, I am not likely to forego a purchase I want in favor of saving for the college education of my future grandchildren. But the day I hold that first grandchild on my lap, my current way of thinking will inevitably change. The formula adjusts with changing circumstances.

Who decides the optimal balance and what to sustain? My wife and I do. We are responsible for sustaining our family; therefore, we must take the actions that will ensure its future. Our personal investment motivates us to make our lives sustainable.

From my perspective, I believe that if we can learn to balance the needs of the natural, economic, social, and cultural aspects of our own lives – to make our own lives sustainable – then we can understand how to collectively balance these needs on a global level. It is only through collective determination that we will reach an equitable and just balance for all, but we must start somewhere. For me, that somewhere is at home.

James Buizer is former director of the Climate and Societal Interactions Program at the National Oceanic and Atmospheric Administration in Washington, D.C.

WITH 6.3 MILLION PEOPLE IN ARIZONA, INDIVIDUAL CHOICES ADD UP

ENERGY

- Replacing 1 incandescent light bulb with a compact fluorescent lamp saves ¼ ton of coal.
- Recycling 1 glass container saves enough energy to light a 100-watt bulb for 4 hours.
- Recycling 1 pound of steel saves enough energy to light a 60-watt bulb for 24 hours.
- Recycling one pound of plastic beverage bottles saves 12,000 BTUs.
- Recycling 1 ton of aluminum saves 64,300 kilowatts.

POLLUTION

- Recycling 1 ton of paper prevents 60 pounds of air pollution.
- Recycled glass generates 20% less air pollution and 50% less water pollution.
- Recycled aluminum produces 95% less air and water pollution.

RESOURCES

- Recycling 1 ton of paper saves 7,000 gallons of water and 17 trees.
- Recycling 1 ton of glass saves 1.2 tons of resources from being mined and eliminates 384 pounds of mining waste.
- Recycling 1 ton of aluminum eliminates the need to mine 4 tons of ore.
- Recycling 1 ton of plastic saves more than 1,000 gallons of gasoline.

WASTE

- The U.S. generates 4 pounds of garbage per capita every day.
- Recycling all of a typical home's waste newsprint, cardboard, glass, and metal can reduce carbon dioxide emissions by 850 pounds per year.
- Product packaging accounts for 1/3 of personal trash.
- Solid waste disposal nationally is the third largest municipal government expense after police protection and education.

Source: Morrison Institute for Public Policy, ASU; data from U.S. Environmental Protection Agency, National Aeronautics and Space Administration, Reynolds Metal Company, Headwaters Cooperative Recycling, Inc., Earth 911, U.S. Energy Information Administration, and National Geographic.

"When I think of how I would apply sustainability principles to my immediate world – my family – I find the concept really quite straightforward. It involves balancing personal choices with personal limits to achieve the best possible results."

Carrying Capacity Must Be Addressed Before People Vote with Their Feet

Todd W. Bostwick, City Archaeologist, City of Phoenix

Arizona's Sonoran Desert is one of the most verdant deserts in the world. More than 100 species of edible wild plants are available, and several rivers provide a steady supply of water for irrigation agriculture. Humans have adapted well to this dry but generous landscape for thousands of years.

Evidence for this adaptation includes numerous ruins from a prehistoric culture called the Hohokam, an agricultural society that constructed dozens of sophisticated canal systems watering thousands of acres of farmland. Domesticated corn, beans, squash, and cotton – and an abundance of wild plants – allowed the Hohokam to settle in villages of as many as 100 to 1,000 inhabitants. Some of these villages were occupied for more than 10 centuries, while arts and crafts flourished. Excavations reveal changes over time in ceramic and architectural styles, but also show a relatively unchanging subsistence base that was well suited to the desert environment.

But after more than 1,000 years, something went wrong. By the 15th century, the Hohokam culture had collapsed and portions of Arizona, including the Salt River Valley, were abandoned. This cultural collapse is reflected in the very name "Hohokam," a Pima (O'odham) word translated as "those who have gone" or "all used up." What happened? O'odham oral traditions speak of social unrest and discontent with Hohokam leaders who resided in certain villages, leading to warfare and destruction. Yet no evidence of large-scale conflict has been found, nor of epidemic diseases. Archaeological and geological data indicate there was a series of floods interspersed with droughts, creating havoc with canal systems. But the Hohokam had rebuilt their canal systems after past destruction, including a large flood at the beginning of the 10th century.

Other archaeological evidence may provide answers. It shows that the Hohokam in the early 14th century were experiencing poor nutrition, in part due to their carbohydrate-rich (corn) diet and degradation of the environment. For example, local fauna had been hunted to scarcity, and the mesquite bosques had been denuded by demand for fuel and



Artist rendering of Hohokam atop mound at Pueblo Grande.
Illustration Credit: Michael A. Hampshire.

construction materials. The results were high infant mortality rates, malnourished children and weaning mothers, and dental infections frequent throughout the population. These society-wide problems likely created a sense of dissatisfaction with leaders at a time when population levels exceeded the carrying capacity of the land.

When floods and droughts occurred in the late 1200s and mid-1300s, people may have begun resisting their leaders' commands to rebuild the canal systems. Eventually, they "voted with their feet" and left, joining relatives or trading partners in other regions. This may explain why today different tribes – such as the O'odham and the Hopi – claim affinity with the Hohokam. They appear to have scattered to the four winds, but in their departure the vanished Hohokam may have bequeathed us an important lesson: The Sonoran Desert can support a surprisingly large number of people, but there are limits to its life-sustaining capacity.

Anthropologist Todd W. Bostwick is the city archaeologist for Phoenix and co-author of *Desert Farmers at the River's Edge: The Hohokam and Pueblo Grande*.

"In their departure, the vanished Hohokam may have bequeathed us an important lesson: The Sonoran Desert can support a surprisingly large number of people, but there are limits to its life-sustaining capacity."

Sustainability's Elusive Balance Must Be Part of Every Policy Decision

Ed Fox, Vice President, Communications, Environment, and Safety, APS

Like beauty, sustainability is in the eye of the beholder. Yes, there are various definitions of the word by authoritative organizations such as the United Nations. But it seems there is little, if any, agreement on how such definitions can be applied in the public policy arena.

Every advocacy group has its own spin on how sustainability translates into policy. Environmental groups believe the earth must be saved as a matter of first instance. Advocates for the poor and hungry, as well as business groups, argue that economic opportunity and wealth need to be created first to address the issues of both the poor and hungry and the environment. In truth, they are all right. Both the power and weakness of the concept of sustainability is that it encompasses all things. Like the "unification theory" in physics, sustainability might prove to be the elusive Holy Grail.

Most of us can agree on three major tenets of sustainability: economics, environment, and social equity. Many hold the perception that these must be in balance. Personally, I believe there is rarely a balance, but rather a dynamic tension, a give-and-take among the three. At any given time, it is more likely than not that one of the three will be ascendant.

In Africa, for example, AIDs and other health concerns make it difficult to worry about environmental issues such as climate change. In China, economic development is such a prime policy force that the Three Rivers Dam was viewed as necessary to provide electricity for

The best news in the fight against climate change is that business is starting to invest in clean energy seriously. But these investments will flourish only if governments are prepared to put a price on carbon. The costs of doing that are not huge. The costs of not doing so might be.

The Economist, "Cleaning Up: How business is starting to tackle climate change, and how governments need to help," May 31, 2007.

the growing economy regardless of the environmental and social impacts of flooding a vast area and dislocating millions of people. In the United States, a robust economy and high quality of life often present the opportunity for environmental issues to take precedence over economic development. That is why vast sums of money can be spent each year protecting normally dry washes as "waters of the United States," even though the washes only run during heavy rain events and are, at best, tenuously connected to any perennial waterway. Which emphasis is right? They each reflect their place and time.

In the end, the challenge of sustainability is not to define it but rather to stay cognizant of its role in decision-making. Analysis of how any decision will impact the environment, the economy, and social equity must be part of the policy consideration.

Some will say this concept of sustainability is obscure. My response is that nothing stays the same long enough to justify casting sustainability into a rigid formula. That would be to diminish sustainability's power: the power to help us make better decisions that address – even if they don't solve – our larger societal desires for a healthier environment, a stronger economy, and a community that helps those who are unable to help themselves.

Ed Fox is former director of Arizona's Department of Environmental Quality and former Assistant Attorney General in West Virginia.

**THE CONCEPT IS HOLISTIC,
ATTRACTIVE, ELASTIC, BUT IMPRECISE.
THE IDEA OF SUSTAINABLE
DEVELOPMENT MAY BRING PEOPLE
TOGETHER BUT IT DOES NOT
NECESSARILY HELP THEM TO
AGREE ON GOALS.**

The Future of Sustainability, The World Conservation Union 2006

"The challenge of sustainability is not to define it but rather to stay cognizant of its role in decision-making."

Take Uncertainty Seriously and Learn from Experience

Kai Lee, Conservation and Science Program Officer, David and Lucile Packard Foundation

Biologist Garrett Hardin popularized a scenario of human behavior that he called the “tragedy of the commons.” Hardin’s theory is a parable illustrating the difficulties of environmental governance. Consider a pasture, he said, open to many flocks of sheep. When there are only a few sheep on a large meadow, all can prosper. But as the numbers grow, there comes a point when the meadow cannot grow enough grass to feed all the animals that graze there. What happens then, he explained, is that to each herder, adding an animal still makes sense because everyone’s animals suffer a little bit, because the grass is no longer sufficient. But if any one herder holds back, others will increase their herds. This is the remorseless logic of the tragedy, Hardin observed: the pasture will become more and more crowded until it is ruined by herders, each of whom is acting in a rational way. It is the rationality of their choices that makes this a tragedy.

Hardin’s point is that the natural world is a commons, a shared environment in which humans lurch past the point of wise use, polluting air with auto exhaust and industrial emissions, overfishing the seas, and overpopulating the planet. Hardin connected population growth to economic growth. Both exert pressures on the natural world and both are shaped by the disconnection between individual interests and



the collective good. If Hardin is right in discerning an inevitable tragedy of the commons, a sustainability transition will be hard or impossible.

The strategy I [recommend] is adaptive management – treating economic uses of nature as experiments, so that we may learn efficiently from experience. Adaptive management is an approach to natural resource policy that embodies a simple imperative: learn from them. In order to live, we use the resources of the world, but we do not understand nature well enough to know how to live harmoniously within environmental limits. Adaptive management takes that

uncertainty seriously, treating human interventions in natural systems as experimental probes. Its practitioners take special care with information. First, they are explicit about what they expect, so that they can design methods and apparatus to make measurements. Second, they collect and analyze information so that expectations can be compared with actuality. Finally, they transform comparison into learning – they correct errors, improve their imperfect understanding, and change action and plans. Linking science and human purpose, adaptive management serves as a compass for us to use in searching for a sustainable future.

Kai Lee is former director for the Center for Environmental Studies at Williams College, and served on the National Research Council’s Board on Sustainable Development.

Reprinted with permission from *Ecology Law Quarterly* and *Compass and Gyroscope: Integrating Science and Politics for the Environment*.

SPECIES DIVERSITY – TOP 10 STATES

RANK	STATE	# OF SPECIES
1	California	6,717
2	Texas	6,273
3	Arizona	4,759
4	New Mexico	4,583
5	Alabama	4,533
6	Georgia	4,436
7	Florida	4,368
8	Oregon	4,136
9	North Carolina	4,131
10	Utah	3,892

SPECIES AT RISK – TOP 10 STATES

RANK	STATE	% AT RISK
1	Hawaii	62.7%
2	California	28.5%
3	Nevada	15.8%
4	Alabama	14.8%
5	Utah	14.7%
6	Florida	14.3%
7	Arizona	13.6%
8	Georgia	12.9%
9	Oregon	10.9%
10	Tennessee	10.3%

Source: NatureServe, 2002.

“The strategy I [recommend] is adaptive management – treating economic uses of nature as experiments, so that we may learn efficiently from experience. Adaptive management is an approach to natural resource policy that embodies a simple imperative: learn from them.”

Attaining Sustainability Requires a Scorecard

V. Kerry Smith, W.P. Carey Professor of Economics, Arizona State University

Everyone loves to keep score. Most aspects of our lives get rated in some way. Sports, computer games, university degree programs, local school systems, and many other factors of daily living are routinely scored.

Scores are important in our economic lives as well. Real gross domestic product (GDP), for example, is a scorecard for gauging the performance of national economies. GDP simultaneously measures the total output of goods and services of an economy in a given time period and the incomes generated in the process of producing them. Unfortunately, official measures of economic activity, prices, and social well-being fail to measure the environmental amenities we enjoy and the services the environment provides. No matter how much we need or value a majestic vista, clean air and water resources, diverse ecosystems, or any other aspect of our “non-market lives,” none of it gets counted by GDP. This practice must change if the challenges posed by continued economic growth are to be met with sustainable solutions. We need a new and expanded economic scorecard that includes the implicit value of environmental amenities and services.

The W. P. Carey School of Business and the Global Institute of Sustainability (GIOS) at ASU recently launched a partnership that should help to develop just such an economic scorecard for sustainability. This new scorecard will measure the importance of environmental amenities. The first part of the scorecard project employs a survey of households in the Phoenix metropolitan area and includes questions that will allow us to analyze and measure the economic

importance of air pollution and heat island effects. Results will be available soon. The next step of the research will address the importance of open space and landscape-related amenities. Later plans call for research regarding the value of water. As an essential resource to sustained urban economic growth as well as the services of urban ecosystems, water must be allocated in ways that balance its contributions to economic activity with its value for sustaining environmental amenities provided by these ecosystems. These environmental values are currently left out of economic scorecards.

Why do we need scorecards in the first place? Scores create incentives for improvement. They highlight what works and what doesn’t. They provide important feedback and planning data for local economies as well as national economies. They allow experience in one context to be transferred to other situations. Sustainability scoring, in particular, will provide a practical method to balance market outcomes with non-market consequences. This record keeping will create strong incentives for firms and households to engage in activities that are associated with positive, rather than negative, feedbacks between what is done in markets and what happens outside them. This process is beginning in Phoenix. But we have good reason to believe the lessons learned here will have wide relevance elsewhere in the world.

Economist V. Kerry Smith is a member of the National Academy of Sciences and is recognized as a pioneer in developing indicators to measure the non-market value of environmental assets.



“Scores create incentives for improvement. They highlight what works and what doesn’t. They allow experience in one context to be transferred to other situations.”

Consumption and Personal Gratification Must Be Redirected Toward Conservation and Community

Jeff Williamson, President, Arizona Zoological Society

Much has been written about achieving sustainability through technological advances, new business practices, and public policy changes. What is not often discussed is the issue of over-consumption. One of the principal questions of our time is whether we can shift cultural values away from aggressive materialism and personal gratification, and instead celebrate conservation and community stewardship as our primary goals. How we came to lose sight of these traditional values is fairly clear.

Until the end of the 19th century, most Americans lived within largely self-contained communities that were close to the land. Responsibility to family, neighbors, and common surroundings was among the highest values, and the consequences of individual actions were usually prompt and obvious. With the Industrial Revolution, however, came technological advances in manufacturing, transportation, and communication that altered almost everything about business, art, religion, ways of life, and understanding of the world. These changes also initiated profound shifts in culture.

Acquisition and ownership became the new central values, and they freed people from their direct ties to natural processes, the common good, and the health of the environment.

Today the power of our technology has enabled us

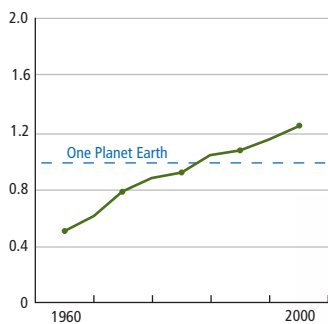
to move even further from reality. While it has produced great benefit, it has come with an incalculable risk: we are now exceeding the carrying capacity of our living systems. If everyone in the world were to consume at the same rate as Americans, says biologist David Orr, all humanity would require 2½ planet earths to supply the necessary resources. This raises important questions: Why do we devote our lives to the pursuit of wealth beyond what is needed to be comfortable? Why do we continue to make irrational choices that imperil the well-being of our communities and the quality of life for future generations?

When people lived close to the land, they learned from the consequences of their choices. Successful communities, therefore, harvested resources cautiously, listened to the accumulated wisdom of elders, avoided wastefulness that might undercut future opportunity, and passed their lessons on to succeeding generations. In modern society, new technologies have linked world communities in previously unimaginable ways, but they have also estranged us from the unpleasant consequences of our consumption. Instead, we are able to wrap ourselves in virtual fantasies that celebrate bigger, cheaper, and greater – but don't revere sustainable or better. The result is we esteem consumption as a value unto itself, and honor superficial celebrity above meaningful achievement.

This attitude must change. If we are to avoid turning sustainability into a meaningless buzz word, we must embrace those values that support the common good and reward behaviors that assure our children's children can live in a healthy world. Selfish consumption and acquiring "McMansions" will not get us there. What can succeed is for each of us to make a personal commitment to pursue conservation, stewardship, and quality of life for our next generations.

Jeff Williamson has been a lifelong conservationist and has served on many conservation organizations including Arizona Riparian Council and Arizona Native Plant Society. Prior to coming to Phoenix, he was deputy director of the Brookfield Zoo in Chicago.

HUMAN CONSUMPTION EXCEEDS EARTH'S ANNUAL RESOURCES (HUMANITY'S ECOLOGICAL FOOTPRINT IN NUMBER OF PLANET EARTHS)



Source: *Living Planet Report*, 2006 World Wildlife Fund, Zoological Society of London, Global Footprint Network.



"Why do we continue to make irrational choices that imperil the well-being of our communities and the quality of life for future generations?"



SUSTAINABILITY AT WORK:

EXAMPLES OF PUBLIC, PRIVATE, AND PUBLIC-PRIVATE PARTNERSHIP INITIATIVES

We need transformation, a wave of social, technical, and economic innovation that will touch every person, community, company, institution, and nation on the Earth.

Alan AtKisson, Cofounder, Sustainable Seattle;
Coauthor, *The Natural Advantage of Nations*

WHERE INGENUITY MEETS OPPORTUNITY AND NECESSITY

The following pages contain 22 of this report's sustainability examples categorized under the headings of **Public Initiatives**, **Private Initiatives**, and **Public-Private Partnerships**. Six other examples appeared earlier on pages 27, 31, and 36.

Like a picture, an example provides a vivid illustration. Featured in this report are 28 working examples of sustainability initiatives developed in both the private and public sectors. Each was selected after talking to experts, sifting through publications on sustainability, and reviewing award-winning programs. Together they demonstrate a wide variety of on-the-ground strategies for addressing sustainability at different scopes and scales including local, state, national, and international.

Many of the ideas behind these initiatives may sound familiar. What makes them different from previous efforts to increase prosperity, improve communities, or protect habitats is that they begin with the quest for balance. Each in its own way: 1) reflects an interest in making improvements for both current and future residents; 2) illustrates how a policy framework for building sustainability can be developed using things we already know; 3) exemplifies practices that can improve multiple trajectories simultaneously; and 4) responds to changing global conditions in a way that acknowledges fundamental connections among economy, environment, and society.

PUBLIC INITIATIVES

DENVER AGENCY INITIATES BROWNFIELD RENAISSANCE FOR ABANDONED AIRFIELDS

Denver Urban Renewal Authority (DURA) is unique in the Denver area for its statutory power to finance redevelopment projects with bonds backed by future tax revenue increases from the project. Working with public and private developers throughout Denver, DURA has provided over \$500 million for redevelopment projects and has helped rehabilitate nearly 15,000 homes. Among the brownfield projects DURA has helped finance are two former airfields: decommissioned Lowry Air Force Base and former Stapleton Airport. The Lowry project has created \$5.7 billion in gross economic benefit to Denver, according to a recent study. Conversion of Stapleton into a modern urban village has earned awards from the nonprofit development group, Urban Land Institute (ULI), and from the nonprofit housing advocacy organization, Homes for Working Families.



PHOENIX HOPE VI OFFERS NEW HOMES AND OPPORTUNITIES

Phoenix won a \$35 million HOPE VI project in 2001 to replace hundreds of public housing units at the 160-acre Matthew Henson Homes site near downtown. Federal HOPE VI grants are earmarked to convert outdated public housing to townhouses or garden-style apartments that enhance a neighborhood. Grants are typically leveraged with other investments in the community. With the involvement of more than 30 public and private stakeholders the project seeks, through both new construction and renovation of some historic buildings, to improve the local economy by drawing businesses, people, and job opportunities to the neighborhood. As of spring 2006, 110 families, including 60 former residents, have moved into the area, and the community celebrated the opening of the new Matthew Henson Apartments, the Vernall Coleman Youth Center, the community park, and the Adult Living Building. An additional 611 residential units are under construction. The community revitalization project is expected to be completed by 2008.



Left: The roof of the 12-story Chicago City Hall building has been retrofitted with a 22,000 square-foot rooftop garden. Photo Credit: Katrin Scholz-Barth, NREL.

CHICAGO SUSTAINABILITY MEANS SEEING GREEN FROM GROUND TO ROOFTOPS

Chicago has dedicated itself to becoming the most environmentally friendly city in the U.S. For the nation's third most populous city, this means seeing green: in parks, on roofs, and along bike paths. The city's Riverfront Improvement Fund helps property owners near Chicago River upgrade deteriorated walls along the river bank. The CitySpace Program converts abandoned properties into community gardens and parks. And a green roof grant program defrays the cost of installing green roofs – Chicago leads the nation with more than 200 green-roofed buildings, including its own historic City Hall. The city also added over 150 miles of bike trails and opened a heated bike commuter facility in Millennium Park near Lake Michigan. For these efforts, Chicago was given the 2006 City Livability Award from the U.S. Conference of Mayors; two years earlier, *Bicycling* magazine named Chicago one of the two best big cities for bicycling in North America.

ARIZONA CORPORATION COMMISSION ORDERS MORE RENEWABLE ENERGY FOR STATE

Clean, renewable energy sources – such as solar and wind – account for only about 1% of the total electricity generated in Arizona. Most of the rest is produced by large electric plants fueled by coal, natural gas, and nuclear energy. In 2006, however, the state's public utility regulator, the Arizona Corporation Commission (ACC), voted for a dramatic increase in renewable energy use. The ACC's new standard will annually raise the requirement for electricity generated by renewables until it reaches 15% in 2025. It will further require that, by 2011, 30% of that power be "distributed generation," which means it must be produced where it is used (e.g., by rooftop solar panels) to reduce loads on transmission lines and power lost in transit. A surcharge added to customer bills will defray initially higher costs for renewables, but that expense is expected to disappear as renewables become more competitive.

WORLD BANK DEVELOPS GREEN ACCOUNTING TO LINK ECONOMY AND ENVIRONMENT

Gross domestic product (GDP) is among the most widely quoted measures of an economy. It represents the total value of all goods and services produced annually by a country. GDP does not, however, account for the value businesses and society receive from the environment. Ecosystem services such as carbon sequestration by forests, medicinal remedies, toxic waste clean-up by microorganisms, and the value of clean air have long been difficult to quantify. To rectify this oversight, the World Bank is developing two new indicators that will link environmental accounting practices to measures of the macro-economy. The "adjusted net saving indicator" attempts to calculate the true rate of savings in an economy by including measures for investment in human capital, depletion of natural resources, and damage caused by pollution. The "wealth estimate indicator" measures total national wealth as an accumulation of produced capital (machinery, equipment, structures, infrastructure), natural capital (land resources, forests, sub-soil assets), and intangible capital (human capital, institutions, governance). The World Bank has already used the latter indicator to calculate new wealth estimates for 120 countries, and in May 2007 hosted "Environmental Economics 101." This workshop and primer was designed to help economists consider environmental assets in economic terms and create incentive policies that reward good environmental behavior while discouraging reckless use.



SCOTTSDALE'S GREEN BUILDING PROGRAM ACTS TO "LEED" BY EXAMPLE

Scottsdale, in 1998, became the first city in Arizona to encourage green building. This technique uses methods and materials designed to reduce environmental impact, energy consumption, and indoor toxins. The city's voluntary program inspects and certifies projects based on standards for site use, energy efficiency, indoor air quality, use of building materials, solid waste, and water use. In 2005, Scottsdale issued 463 green building permits and reported that 33% of all single-family residential building permits adhered to program standards. Both are significant increases over past years. Scottsdale officials also acted to make their city first in the nation to adopt national LEED (Leadership in Energy and Environmental Design) certification for municipal facilities. The city's first Gold certified project was the Scottsdale Senior Center at McDowell Village. SkySong, the ASU Scottsdale Innovation Center, is expected to be Arizona's largest privately financed LEED certified project.

BRAZILIAN CITY COUNTERACTS GROWTH AND POLLUTION WITH LOW COST, HIGH POWER BUS SYSTEM

Curitiba is Brazil's seventh largest city with 1.8 million people anchoring a metro of over 3.5 million people. Faced in the early 1970s with rapid growth, increased congestion, and air pollution, the city lacked necessary funds to build a much-needed subway system. Instead, a group of young planners, engineers, and architects at Brazil's oldest university devised an innovative plan for an integrated bus system that was built for a fraction of the cost of a subway but with similar speed and efficiency. Central to the plan is a triple – or trinary – road system that dedicates one central lane solely for two-way express buses that move commuters at a subway-like pace and two flanking lanes for one-way speedy car traffic. Other routes use high capacity, articulated buses carrying up to 270 passengers much like a train. Specially designed transfer terminals function like subway stations, quickly boarding passengers via tube-shaped bus platforms. Buses are distinguished by color according to purpose. An estimated 75% of commuters – more than 2.3 million people per day – make use of the Curitiba transit system, which is credited with helping control traffic congestion even as the number of cars has skyrocketed.

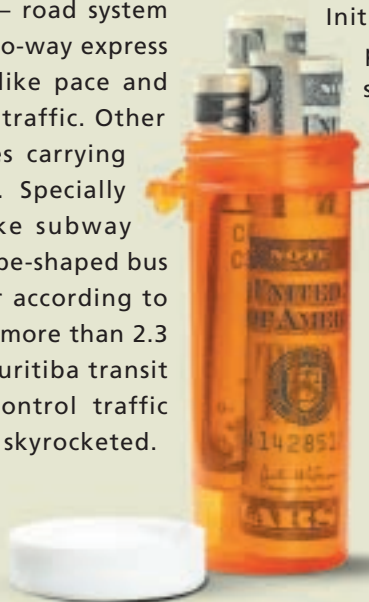
PRIVATE INITIATIVES

ARIZONA'S STIRLING ENERGY SYSTEMS DEVELOPS UTILITY-SCALE SOLAR POWER FOR WORLD'S LARGEST INSTALLATION

Phoenix-based Stirling Energy Systems (SES) has developed technology to efficiently generate utility-scale electricity by using heat from the sun to drive an engine-generator device that runs quietly and produces no emissions. Prototypes of the system have been tested successfully at Sandia National Laboratories in New Mexico. Thousands of dishes must be linked together to produce grid-quantity power. The company has pending contracts with two southern California utilities to build the world's largest solar power plants and potentially provide power to hundreds of thousands of Southern California homes. The first plant, for Southern California Edison, will be located in the Mojave desert northeast of Los Angeles and will initially produce 500 MW of electricity with possible expansion to up to 850 MW. Completion of its initial phase is expected by 2009. The second plant, for San Diego Power and Gas, will be built in the Imperial Valley and will begin with 350 MW of power with possible expansion to 900 MW.

BAXTER HEALTHCARE CORPORATION SAVES MONEY AND WASTE WITH TRIPLE BOTTOM LINE ACCOUNTING

Baxter Healthcare Corporation is a worldwide provider of pharmaceuticals and medical devices with 47,000 employees worldwide and annual sales close to \$10 billion. Since 1997, the company has used a triple bottom line approach to measure success across economic, social, and environmental performance, and it follows Global Reporting Initiative guidelines to document sustainable practices. This focus has helped Baxter reduce spending on energy, packaging, and waste disposal. The company's culture of sustainability is maintained throughout the company, from board members who review Baxter's environmental goals down to line-level managers who must meet environmental targets as part of their individual performance objectives. It also employs a product sustainability review process that follows lifecycle costs from development through disposal. In addition to its cost savings, the company has also cut toxic air emissions by 86% per unit of production and reduced packaging materials by 19% since 1997.





Left: Interface, Inc.'s modular carpets are certified 'climate-neutral' based on the company's sustainability practices and carbon offsets. Photo Credit: InterfaceFLOR® image by Bruce Quist.

STEEL PARK WIND PROJECT WILL REDUCE AIR POLLUTION AND SAVE WATER

A Canadian company with Arizona connections is expected to construct the state's first commercial-grade wind farm near Kingman. Called the Steel Park Project, this 15-megawatt (MW) installation will occupy 1,100 acres and involve a \$20 million capital investment by Scottsdale-based Verde Resources Corp., a subsidiary of British Columbia-based Western Wind Energy. The project could generate enough electricity to power about 4,000 average homes. Western Wind, however, has secured leases on additional land to enable expansion of the facility to produce more than 200 MW of electricity – enough to power more than 50,000 homes. APS has agreed to purchase the facility's initial output. Wind farms are considered appropriate for desert areas because they use only a small fraction of the water needed to operate a coal-fired power plant. Western Wind has also considered devoting a part of the energy to generate hydrogen, and University of Arizona researchers have suggested the project's wind could be employed to desalinate brackish ground-water in the region.

INTERFACE PLANS FOR MISSION ZERO WILL ELIMINATE ENVIRONMENTAL IMPACTS

Interface is a leading global manufacturer of commercial carpet and fabrics with offices in more than 100 countries. The company sees the business world at the forefront of an emerging "second industrial revolution" in which resources have become scarce and waste products must be reused productively to increase efficiencies and competitive advantage. With this future in mind, Interface has committed to a Mission Zero plan for eliminating all negative environmental impacts from its operations by the year 2020. As of 2006, Interface had converted seven of its manufacturing sites to 100% renewable energy power and increased its overall use of renewables to 16%. Recycled content in its products increased from less than 0.5% to 20% since 1996, and total manufacturing waste was cut by 70%, thereby avoiding over \$300 million in cumulative landfill costs. Interface has also reduced its greenhouse gas emissions per unit of production by 60% over its baseline, adjusted for acquisitions. At the same time, carpet products from Interface have been designated as Environmentally Preferable Products by an independent certifier. This green advantage has driven up demand and competitiveness, and helped the company grow dramatically. Interface also develops new sustainable technologies and teaches the techniques of sustainable business through a consulting branch. Clients include Wal-Mart, General Mills, and NASA. The Environmental Protection Agency recently recognized Interface for its work with LaGrange, Georgia, to convert methane gas from a city landfill into renewable energy that Interface now purchases for operations.

Research is creating
new knowledge.

Neil Armstrong, U.S. Astronaut
and first human to set foot on the moon.



JOHNSON & JOHNSON NURTURES TALENT, DIVERSITY, AND FAMILIES

Johnson & Johnson has won many accolades for diversity and equality in the workplace. For over two decades, *Working Mother* has ranked the company among the top 100 best corporations for women with children, *DiversityInc.* magazine places it at number 17 on its list of "Top 50 Companies for Diversity," and *Fortune* consistently rates it as one of the most admired companies in the world. Johnson & Johnson earns these rankings by surveying its workers regularly on job and life issues, then using the results to fine-tune the company's policies. Among its family-oriented programs, the company operates daycare centers for children of employees and provides full- and part-time care and special summer programs. The company also offers new mothers three weeks of leave at full pay and at least three more weeks at partial pay. New fathers and adoptive parents also receive a one week paid leave. A global provider of health care products, Johnson & Johnson employs over 116,000 people in 57 countries and generated \$50 billion in sales in 2005.



NATIVE SEEDS/SEARCH BANKS ANCIENT CROPS AND CULTURE

American Indians thrived in Arizona for many generations, supplementing their diet with crops of corn, squash, beans, and other native plants. In recent times, however, these arid-adapted crops began to disappear. Native Seeds/SEARCH (NS/S) was founded in 1983 to fulfill a request from Tohono O'odham farmers in central Arizona to find the right seeds for cultivating traditional food. A nonprofit conservation organization, NS/S serves as a seed bank and clearinghouse of information on ancient crops, and now contains 2,000 varieties, including amaranth, cotton, devil's claw, and tomatillo. It also sells the foods produced from these seeds, including mesquite meal, beans, and chilies. In addition, NS/S has established a Gardeners' Network as a way to utilize gardeners throughout the country to evaluate the seed bank's heirloom crops.

XANTERRA PARKS & RESORTS MAKES TOURISM GREENER FOR ENVIRONMENT AND BOTTOM LINE

Xanterra Parks & Resorts is the country's largest national and state park concessionaire. Rooted in the Fred Harvey Company legacy and serving up to 17 million customers annually, the company seeks ways to reduce environmental impact while strengthening its business. From 2000 to 2006, Xanterra increased its use of renewable energies in national parks from 0% to 6.7% and decreased solid waste by more than 17%. Greater fleet and operations efficiencies helped cut greenhouse gas and air pollutants 4.75% over five years. In 2004, the company committed to decrease its carbon-dioxide emissions by 9,300 tons within 11 years. For its 64 restaurants, Xanterra expanded its sustainable seafood policy into a "sustainable cuisine" program that boosted purchases of organic and locally produced foods by 50% in 2004 to \$1.4 million. The company also built the first LEED certified housing structure in a national park. In Arizona, Xanterra's Grand Canyon South Rim operation won the company's Ecologix Award for best practices in 2004 for diverting 40% of its waste from landfills.

PUBLIC-PRIVATE PARTNERSHIPS

GILBERT & BENNETT WIRE MILL REDEVELOPMENT CREATES JOBS, PROTECTS HERITAGE

When the Gilbert & Bennett Wire Mill closed in 1989, the town of Redding, Connecticut (population 8,500) was left with a 55-acre contaminated industrial site in its primary commercial zone and unpaid taxes that eventually totaled over \$1 million. In 2003, the community partnered with a developer and government officials to host a week-long planning session of more than 1,000 stakeholders to work out a master plan for redevelopment, environmental cleanup, and historic preservation. The result is a strategy for a mixed-use new neighborhood with 300,000 square feet of commercial space, 400 homes, and several new public buildings, including a railroad station, performing arts center, and public pool. Fifteen of the site's historic buildings will be rehabilitated. When the project is completed, Redding estimates it will create 1,500 permanent jobs, generate nearly \$5 million in tax revenue, and raise property values by \$300 million. The project's special taxing district is among the first to qualify with the U.S. Treasury as a sustainable design project for the purpose of issuing tax-exempt bonds.

ENVISION UTAH PLANS FOR 1 MILLION NEW RESIDENTS WITH QUALITY GROWTH STRATEGY

Envision Utah was launched in 1997 to address the prospect of 1 million additional residents in the Greater Wasatch Area by the year 2020. A partnership of civic and business leaders in the Salt Lake City area, Envision Utah gathered broad public input and support in a consensus-building effort to develop a regional plan called the Quality Growth Strategy. The resulting plan identifies several overarching goals, such as community-friendly economic development, increased transportation choices, and preservation of critical lands. It also presents 32 different strategies for implementation of goals, such as expanding workforce development and community amenities as growth occurs, creating a regional transit system, and encouraging infill. The group estimates that implementing the transit network and other proposals could reduce overall infrastructure costs by \$4.5 billion compared to typical sprawl. Envision Utah continues its mission by educating government and developers about what the public wants, and then offering the training that officials and companies need to implement those goals.

TUCSON'S RIO NUEVO PROJECT PLANS TO RESTORE DOWNTOWN AS WELL AS A RIVER

Tucson voters in 1999 approved a ballot measure to use tax increment financing by diverting a portion of downtown sales tax revenue growth to fund a comprehensive revitalization plan known as the Rio Nuevo Project. Encompassing more than five square miles of downtown and generating up to \$800 million in public and private investments, Rio Nuevo calls for 47 different projects and attractions to be constructed over the next 10 to 15 years, including construction of 1,200 new housing units downtown and restoration of part of the Santa Cruz River riparian area. Among anticipated economic development projects are the Presidio Museum, a Native American culture center, a joint Arizona-Sonora visitor and trade center, and a new University of Arizona Science Center. Already, several historic buildings and sites have been protected by Rio Nuevo, including archaeological ruins at Tucson's Presidio, an 1860s adobe home, and two historic downtown landmarks – the Rialto and Fox theaters.





An educational session in progress in a Boston community garden.
Photo Credit: Boston Natural Areas Network.

BOSTON'S COMMUNITY GARDENS PROVIDE HEALTHY FOOD WHILE IMPROVING DISTRESSED NEIGHBORHOODS

Boston's long tradition of community-based gardens was revived during the 1970s. Today, the Boston Community Gardens project involves 6,000 low- and moderate-income families who cultivate 175 community gardens and produce nearly \$1.5 million worth of food each year. The activity not only provides city dwellers with fresh, healthful food, but it also saves the energy costs for transporting non-local foods and it brings collateral benefits to participating neighborhoods by opening up social dialogue among families, fostering neighborhood pride, and involving the gardeners in important community issues. The community gardens concept has proved particularly successful in economically distressed areas where contaminated vacant lots have been cleaned up and converted to green space. Both publicly and privately owned, individual gardens are managed by homeless shelters, rehabilitation centers, housing developments, senior centers, day care centers, and neighborhood residents. Several city departments and nonprofits work together to provide gardeners with fundraising assistance, a resource guide, and grant dollars. City-supported farmers markets also offer a venue for sale of locally grown produce.

The typical American prepared meal contains, on average, ingredients from at least five countries outside the United States.

Rich Pirog and Andrew Benjamin,
Leopold Center for Sustainable Agriculture,
Iowa State University

PHALEN CORRIDOR PROJECT INTEGRATES JOBS, HOUSING, AND URBAN GREENSPACE

The Phalen Corridor redevelopment project in Minnesota is working to restore economic, environmental, and social prosperity to St. Paul's East Side, a traditionally working class immigrant area where the loss of manufacturing has led to high unemployment rates. Composed of more than 60 partners – including 3M, Metropolitan State University, and both state and federal governments – this project has attracted more than half a billion dollars. In addition to integrating new businesses, jobs, and housing, project partners have converted a former shopping center into a wetlands area that borders new developments, constructed new bike trails connected to the city's metro bike trail network, added recreation parks close to a proposed affordable housing development, and slated over 100 acres of brownfields for cleanup. To ease traffic congestion, partners are also developing low- and moderate-income housing within walking distance of jobs, recreation, and social services. Currently, 700 units of sustainable housing are under construction, and over 2,000 jobs have been added to the area.



MARATHON OIL WORKS TO BEAT THE FEVER WITH MALARIA CONTROL IN EQUATORIAL AFRICA

Marathon Oil had never before engaged in a major public health initiative, but the company began in 2002 to lead a campaign to eliminate malaria in Equatorial Guinea. This coastal country contains 40% of Marathon's natural gas reserves, but has an extremely high malaria rate that threatened operations there. Seeing that its economic fate was linked to the nation's health, Marathon partnered with the government of Equatorial Guinea, nonprofit Medical Care Development International, and others to develop a \$12 million anti-malaria plan. Primarily focused on prevention, the program has sprayed interior walls of nearly 100,000 homes with long-lasting insecticide to kill biting mosquitoes before they can spread infection. After the first two years of malaria control, reports show a 95% drop in infected mosquitoes and a 40% drop in infected children. Meanwhile, the program has improved treatment through introduction of new combination drug therapies and continues monitoring by installing mosquito traps to check for new outbreaks of infection.

APS RESTORES FLOW TO FOSSIL CREEK FOR BENEFIT OF NATIVE FISH AND UNIQUE HABITAT

In June 2005, Arizona's largest electric utility, APS, "undammed" central Arizona's Fossil Creek after a century of water diversion for power generation. The utility called the decision "the right thing to do" given the choice of maintaining less than 1% of its generation or returning a unique watershed to its historic natural condition. Fossil Creek is a perennial stream near the community of Strawberry that flows from one of Arizona's largest spring complexes at the base of the Mogollon Rim and empties into the Verde River in the Mazatzal Wilderness. Running through remote and rugged terrain, the creek remains at approximately 70 degrees Fahrenheit year round and is known for creating clear blue travertine pools. Decommissioning of APS hydroelectric operations followed a multi-year planning process that involved the utility, federal and state agencies, environmental organizations, and Northern Arizona University. Restoration involved several stages, including removal of non-historic buildings, eradication of exotic fish species, and construction of a fish barrier to prevent non-native recolonization. A long-term monitoring program will gauge progress of the project and provide a mechanism to resolve any concerns. The creek was recently nominated for Wild and Scenic River status, which requires Congressional approval.



TELEWORK ARIZONA REDUCES TRAFFIC AND POLLUTION, AND SERVES AS A MODEL FOR OTHERS

More than twice as many employees in Arizona work from home as commute by public transportation. Much of this is due to joint public and private efforts to encourage telework – the idea of using electronic communications to work away from the office. The state's own program, Telework Arizona, kicked off nearly two decades ago when AT&T and the state of Arizona jointly conducted a pilot project that demonstrated work-at-home programs can reduce pollution, ease traffic congestion, increase productivity, and improve job satisfaction. Telework Arizona now assists many corporations and other governments in establishing their own telecommuting initiatives. The state program continues to improve. A recent accounting shows that more than 19% of all state government employees in Maricopa County now telecommute regularly, and program leaders estimate that state teleworker employees annually cut 5 million commuter miles, 177,000 hours of drive time, and 171,000 pounds of air pollution.

These before-and-after photographs show changes in Fossil Creek water flow due to decommissioning of an upstream diversion dam. Photo Credit: Nick Berezenko.





ARIZONA'S SUSTAINABLE FUTURE

The main thing history can teach us is that human actions have consequences and that certain choices, once made, cannot be undone. They foreclose the possibility of making other choices and thus they determine future events.

Gerda Lerner, Emerita Professor of History at University of Wisconsin

SUSTAINABILITY: A NEW ORGANIZING PRINCIPLE

Michael M. Crow, President, Arizona State University

The need for action is urgent: demand for energy and transportation is growing rapidly in many developing countries, and many developed countries are also due to renew a significant proportion of capital stock. The investments made in the next 10-20 years could lock in very high emissions for the next half-century, or present an opportunity to move the world onto a more sustainable path.

Nicholas Stern, former Chief Economist to the World Bank, from *The Economics of Climate Change*

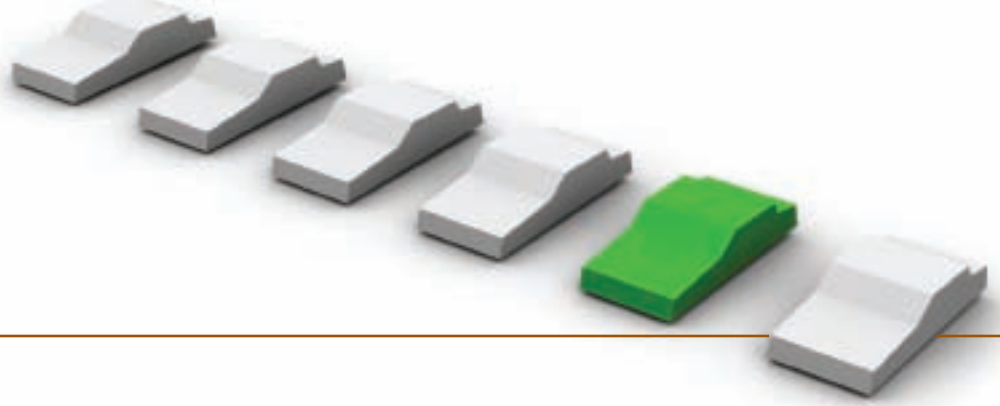
With a global population of 6.5 billion projected to increase to 8.5 billion by mid-century, we face challenges of unimaginable complexity as a species and as a society. The continuing integration of nations and economies worldwide is making us increasingly interdependent, while at the same time we all are wholly dependent on the dynamic, interactive biogeochemical cycles that make life on earth possible in the first place. Yet though the challenges that confront us are global in scale, we must address many of their impacts locally because Arizona represents a microcosm of the larger scenario.

Nevertheless, as we impinge more and more on natural systems – and as the environment of our planet falls increasingly under the domination of a single species with the capacity to modify natural systems, consume resources, and generate waste on a scale that even in the recent past would have been unimaginable – we face problems seemingly beyond our historic capacity to solve. The world's nations have fallen behind in developing the infrastructure necessary to create and maintain prosperity for all citizens, and they have not yet determined how to balance the needs of humanity with the long-term consequences of human impact on environmental systems. Similarly Arizona simultaneously benefits from and is stressed by a rapidly growing population urbanizing a fragile desert environment.

We must, therefore, realize we are at a critical juncture in the evolution of our relationship to our life system. The long-term sustainability of our state, our nation, and even our planet remains in doubt. The evidence of Hurricane Katrina brought home the notion that things really are far more complex and interconnected than we ever suspected, and that at present we seem to operate beyond our ability to plan and implement effectively, or even conceive what needs to be done in certain circumstances. Among the lessons we should have learned from the disaster on the Gulf Coast is that we must incorporate sustainability into our policies and planning because our lives depend on it.

The concept of sustainability is sometimes mistakenly equated with an exclusive focus on the environment. This report, however, demonstrates that sustainability is much more than that. Sustainability embraces environmental concerns, certainly, but its implications are far broader, spanning issues essential to economic development, health care, urbanization, energy, materials, agriculture, business practices, social services, and government – in short, all the concerns of daily life in societies around the globe. Sustainability acknowledges the economic needs of human societies, but in its framing seeks a balance with social values, justice, and the environment.

While we must consider that being able to mount an effective response to a disaster the magnitude of Hurricane Katrina could be mere child's play compared with addressing such issues as global climate change and ecosystem collapse, we should also understand that we



have more knowledge at our disposal than we realize. The descriptions of activities and practices by local, national, and international organizations that appear throughout this report show that a variety of strategies and technologies can improve the human condition, protect the environment, and make companies more profitable. For example:

- A commercial carpet company in Georgia captures methane emissions from public landfills to help convert its manufacturing plants to 100% renewable energy, thereby giving it a significant competitive advantage.
- A small community in Connecticut works with a developer to clean up a toxic abandoned industrial site and convert it to a revenue-producing center that helps create businesses, homes, jobs, and public amenities.
- An Arizona company uses a 19th-century invention to develop an emission-free engine that converts the sun's heat to utility-scale electric power.
- A Bangladeshi bank pioneers micro-lending in struggling communities to launch businesses and reduce poverty.

These are just a few examples of initiatives that, at scale, could have profound positive effects on our capacity for sustainability. Thus, we must vastly improve our ability to communicate the knowledge and ideas we already possess, so that we can readily deploy them to improve the quality of our lives, our state, and our planet.

Our universities play a unique and powerful role in ideas and information for sustainability. But neither academic research nor even the best collaborative efforts of scholars can in isolation create a sustainable future. Sustainability will require the application of enormous amounts of capital – political, intellectual, and financial – to develop the leadership, consensus, integrative science, and technology that will enable society to achieve sustainability. To advance solutions, scholars and researchers must be committed to solving real-world problems and efficiently channeling science-based solutions to state, community, and industry leaders. In turn, decision-makers must become more knowledgeable about sustainability and its economic, environmental, social, cultural, and geographic implications so they can thoughtfully engage universities and other research institutions in addressing the critical issues that confront us.

As *Sustainability for Arizona* points out, the communities that will enjoy sustained prosperity in the 21st century will be those that create resilient local economies by making the unique strengths of their places, institutions, and people into sources of competitive advantage. So, too, our institutions, whether in the public or private sector, must each leverage their potential.

Together, Arizona's local, regional, and state policymakers, resource managers, industry leaders, and scholars must coordinate their efforts to tackle issues associated with sustainability,

Many environmentalists take it for granted that rich countries will have to cut their consumption sharply to stave off ecological disaster. There is another approach. Global public policies and market institutions can promote new technologies that raise living standards yet reduce human impact on the environment.

Jeffrey D. Sachs, Director of Earth Institute, Columbia University, from "The Promise of the Blue Revolution," *Scientific American*, July 2007

ADAPT OR PERISH, now as ever, IS NATURE'S INEXORABLE IMPERATIVE.

H.G. Wells, *Mind at the End of Its Tether*, 1945

including the impacts of rapid growth, human health, economic well-being, ecosystem viability, and biological diversity. Arizona must make the difficult but powerful policy choices to reduce natural resource consumption, waste production, traffic congestion, air pollution, and energy use. We should embrace innovative policies that promote renewable energy, disease prevention, water conservation, affordable housing, infrastructure investment, cultural development, equitable opportunity, and an innovation economy that will deliver the knowledge and technologies we need to address contemporary and future sustainability issues. We must invest in people and institutions to put creative policies into effective practice and devise scorecards to track how we are doing.

Furthermore, whether in terms of new discoveries, technologies, services, or products, the results must be exportable, and in this regard Arizona is in a strong position. As Jonathan Fink, The Julie A. Wrigley Director of ASU's Global Institute of Sustainability and ASU's university sustainability officer observes in his essay, "Figuring out how cities can expand economically while avoiding unsupportable stresses on the ecosystem and social fabric is one of the most important challenges the world faces. The region where these things are being most aggressively studied is metropolitan Phoenix." In fact, this is precisely why ASU created the Global Institute of Sustainability and why prominent leaders, such as Julie Wrigley, are supporting its mission.

Neither the world nor Arizona is now on a trajectory that is ultimately sustainable. Thus, it is incumbent on academic, business, and government leaders to demonstrate persuasively that the advancement of social and economic interests is wholly compatible with sound environmental stewardship. Now is the time for those at the helm to commit their organizations and institutions to transforming our collective consciousness.

In order to reconcile Arizona's historic development practices with its environmental limits – and to do so in a socially just way – our leaders must be willing to rethink and reconfigure their institutions to foster scientific and public policy solutions that can guide a conscious transition toward a more sustainable future. In this regard, Arizona leaders should start by answering some tough questions:

- How can public and private institutions best collaborate to create solutions to our most pressing environmental, economic, and social problems?
- How can we depoliticize the public decisions needed to get Arizona on a sustainable trajectory?
- How can we monitor our progress toward sustainability?
- How can we encourage and enable Arizona businesses to adopt sustainable operating and production practices without impinging on profitability?
- How can public sector services and activities become more efficient?
- How can we tap into the passion many residents and visitors already have for a sustainable Arizona?
- How can we communicate the sustainability message to positively influence the behavior of all individuals?
- How can we design or redesign efficient new developments and existing communities?



This report began with the notion that the 20th century was about raising Arizona, while the 21st will be about sustaining it. We are at the beginning of a long-term journey to become a more sustainable state. Far more than the latest trend or fleeting concern, sustainability is truly the issue of our age. As such, it demands our commitment both to step-by-step progress and to embracing bold policy ideas that will bring about rapid and efficient systemic changes.

Contributors to this report have recommended numerous policy changes that fit both descriptions. Together, they could be taken as Arizona's first sustainability agenda. They include:

- Expand access to 21st century education and job skills for adults
- Ensure equity and quality in Arizona's P-20 education systems
- Develop programs for sustainability transfer just as universities have for technology transfer
- Require regional planning that integrates water use and mobility options in existing and new communities
- Enhance dedicated funding mechanisms, such as the Heritage Fund, that are available for environmental restoration and community rehabilitation
- Update groundwater management policies throughout Arizona
- Provide incentives and information to Arizona businesses to support industrial recycling facilities and more technologies for sustainability
- Create a sustainability scorecard and use it for consistent monitoring, feedback, and planning
- Embrace sustainable goods, services, and knowledge as a focus for economic development

To make good on this sustainability agenda, Arizonans must consider and respond to some important issues: How can we encourage and help residents and visitors to make smart choices for reducing wasteful consumption, building community, and fostering sustainability? How can we make the investments that are needed now and over time to support sustainability?

A concept like sustainability has every potential to become a new principle for organizing knowledge production and application and for reorganizing our institutions. Sustainability is a concept with as much transformative potential as justice, liberty, and equality, and we must foster its discourse and implementation both in our academic institutions and broadly across business, industry, and government. Because turning points like this are rare in the evolution of our consciousness, and the stakes are so high, we must not hesitate to take the right steps and make the necessary investments. The central question that confronts us is whether we will be able to choose wisely among alternative trajectories. This report should convince us that we are now at the stage where there is everything to win and everything to lose.

Prior to becoming ASU's president in 2002, Michael Crow served as executive vice provost of Columbia University. He is a fellow of the National Academy of Public Administration and teaches the course, "Science, Technology, and Public Affairs," in the School of Public Affairs, College of Public Programs, ASU.

If we don't act, the overall costs and risks of climate change will be equivalent to losing at least 5% of global GDP each year, now and forever... In contrast, the costs of action – reducing greenhouse gas emissions to avoid the worst impacts of climate change – can be limited to around 1% of global GDP each year."

Nicholas Stern, former Chief Economist to the World Bank, from *The Economics of Climate Change*



SELECTED resources and references

To broaden the discussion and learn more about sustainability efforts in action around the nation and the world, a good beginning point would be the resources on sustainability listed below. These selections offer a wide variety of ideas and assistance as well as connections to further resources.

ENVIROLINK provides a searchable electronic library with links to thousands of online resources in categories including air quality, energy, health, sustainable business, and transportation. www.envirolink.org

GLOBAL 100 recognizes the 100 most sustainable corporations in the world judged on their ability to identify and manage the environmental, social, and governance issues that affect their business; updated annually. www.global100.org

GLOBAL FOOTPRINT calculates the overall ecological impact of 150 countries in terms of whether their consumption outpaces their biological capacities in order to help them better manage their assets; includes a footprint calculator for individuals. www.footprintnetwork.org

RESOURCES FOR THE FUTURE conducts independent economic and social science research on the environment, energy, and natural resources for the purpose of improving public policy; recent research reports cover emissions trading, coal energy, and the non-market benefits of nature (Green GDP). www.rff.org

SMART COMMUNITIES NETWORK provides information links, news, and success stories from around the country to help communities deal with sustainable land use planning, transportation, business, financing, building, and measuring progress. www.smartcommunities.ncat.org

SMART GROWTH ONLINE offers a searchable database of resources and news on issues such as community quality of life, design, economics, health, and housing. www.smartgrowth.org

SUSTAINABLE COMMUNITIES NETWORK provides sustainability resources and case studies of successful projects to help people create a safe, livable, healthy community. www.sustainable.org

SUSTAINABLE MEASURES offers online resources to help organizations create indicators for measuring sustainability progress and offers private consulting to government and businesses. www.sustainablemeasures.com

SUSTAINLANE GOVERNMENT provides a searchable knowledge base of best practices for sustainability in government, including examples in the categories of climate change policy, economic development, energy efficiency, agriculture, forestry, green building, and transportation. www.sustainlane.us

UNIVERSITIES in Arizona provide access to sustainability-related resources including research, new technologies, academic programs, campus green initiatives, events, and community outreach.

Arizona State University: <http://sustainability.asu.edu>

Northern Arizona University: <http://nau.edu/environment>

The University of Arizona: <http://sustainability.arizona.edu>

U.S. GREEN BUILDING COUNCIL provides information on green building design, construction, and operations, and on the Leadership in Energy and Environmental Design (LEED) certification for both the private and public sector. www.usgbc.org

WORLDCHANGING offers sustainability information and commentary in an online newsletter format covering topics that include shelter, cities, business, politics, and the planet. www.worldchanging.com

SUSTAINABILITY

Our Actions Tell Our Story

Prisma Graphic is glad to participate with Arizona State University in producing a report that not only analyzes sustainability policies and practices, but also exemplifies them.

Here at Prisma, we do more than just talk about sustainability. We work hard to make it an everyday reality. That is why we earned the prestigious Forest Stewardship Council (FSC) certification to help protect the environment. FSC is an international collaboration of environmentalists and businesses to promote sustainable forest management, wildlife and stream preservation, and biodiversity. The FSC "Chain of Custody" process tracks wood fiber from its original point of harvest all the way to the end consumer, assuring that paper used on a project is linked directly to sustainable forestry.



FSC certification was a logical step in our mission to become a completely green printer. We have also developed an internal sustainability program focused on reducing overall power consumption, recycling production materials, and properly disposing of chemicals. As part of this program, we have installed or implemented:

- ▶ FSC Certification
- ▶ Company-wide recycling program
- ▶ EPA's VOC Disposal/Monitoring Program
- ▶ Vegetable and soy-based inks
- ▶ High efficiency HVAC and Fresh Air units
- ▶ Maricopa County's Trip Reduction Program (TRP)
- ▶ Night-time computer shut-down policy
- ▶ Low-wattage lighting



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Morrison Institute for Public Policy conducts research that informs, assists and advises Arizona leaders and residents who shape public policy. A unit of the School of Public Affairs (College of Public Programs), the Institute is a bridge between the intellectual assets of Arizona State University and the community. Morrison Institute was established in 1982 through a grant from Marvin and June Morrison of Gilbert, Arizona.

The Global Institute of Sustainability catalyzes and advances interdisciplinary research and education on environmental, economic, and social sustainability, bringing together life scientists, social scientists, engineers, and government and industry leaders to share knowledge and develop solutions to real-world problems.



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Stora Enso is pleased to be a sponsor of Morrison Institute for Public Policy's *Sustainability in Arizona* report. This report was printed on Centura Matte 80 lb. text and cover which meets chain of custody certification requirements from three independent third-party certification systems.

