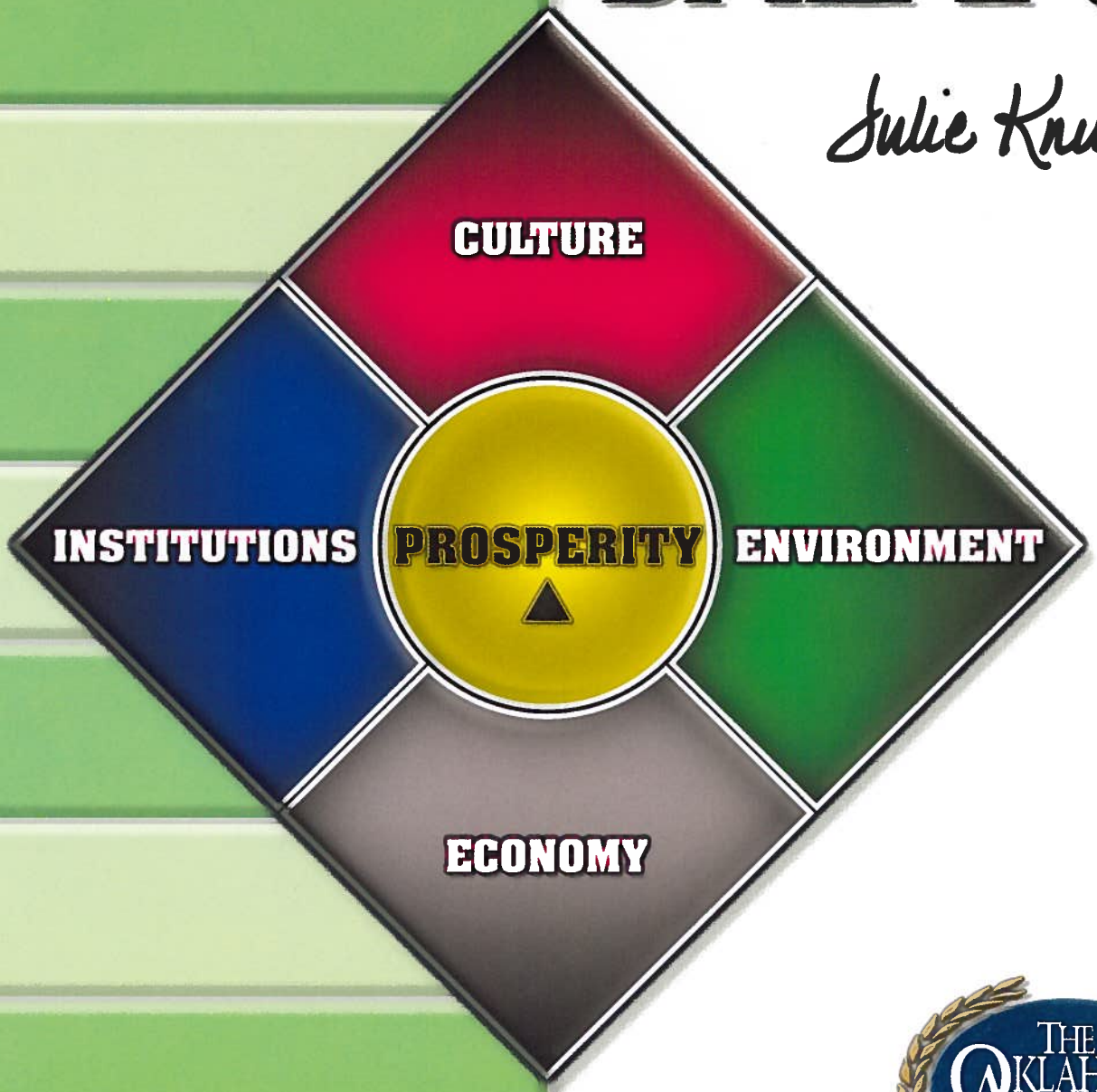
OKLAHOMA'S ENVIRONMENT:

PURSUING A RESPONSIBLE BALANCE

Julie Knutson



THE OKLAHOMA ACADEMY

Moving Ideas Into Action

2004 TOWN HALL

NORMAN EMPLOYEE DEVELOPMENT CENTER

OCTOBER 10-13, 2004

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Introduction

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Oklahoma

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Native American

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Moving Ideas Into Action

this town hall

Our 2004 Town Hall

Julie Knutson, President and CEO, Oklahoma Academy; Bill McKamey, Vice-President, American Electric Power; Michael Lapolla, University of Oklahoma; & Craig Knutson, E-conographic Consulting

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This document was assembled to allow Town Hall members to educate themselves on the Energy and Water issues prior to our November Town Hall. It will help you become reasonably fluent and able to participate in informed group debate and discussions. And it will serve as a reference source for you.

Our 2004 Town Hall will be the "bookend" to last year's "Oklahoma Resources: Energy and Water". This year our focus will be on the Environment. We are tentatively calling it "Oklahoma's Environment: Pursuing A Balance." Here's what we mean by that.

We are a young state and our environment is "fresher and healthier" than many other states. The question is how to maintain that advantage while pursuing other commercial and social interests. In other words, how do we maintain the balance? How do we foster what is called "sustainability" in our state?

And we are going to add one factor that most other states cannot consider. That is Indian sovereignty issues. Why? Because tribes can, and have, petitioned the federal Environmental Protection Agency for "state status" in setting air and water quality standards. In other words, a tribe may set such standards higher or lower than state standards. While this may not practically have a major impact in our state, it is too easy for misunderstandings to flourish.

Our research team included Mike Lapolla, Craig Knutson and Dr. Will Focht. Mike and Craig are veteran Academy members. Will was introduced to the Academy last year and is offering a wealth of insight and structure to our effort this year. Will is the Director of the Environmental Institute, and Associate Director of the Environmental Sciences Graduate Program at Oklahoma State University.

We have organized our research around a sustainability model that is somewhat complex. To simplify, there are four categories of behavior that are interdependent and flow in a circle. Look at the opposing page and you will see our graphical representation of this model. It looks like a "Rubik's Cube" - and is just as complex.

Bill McKamey
Chairman
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Julie Knutson
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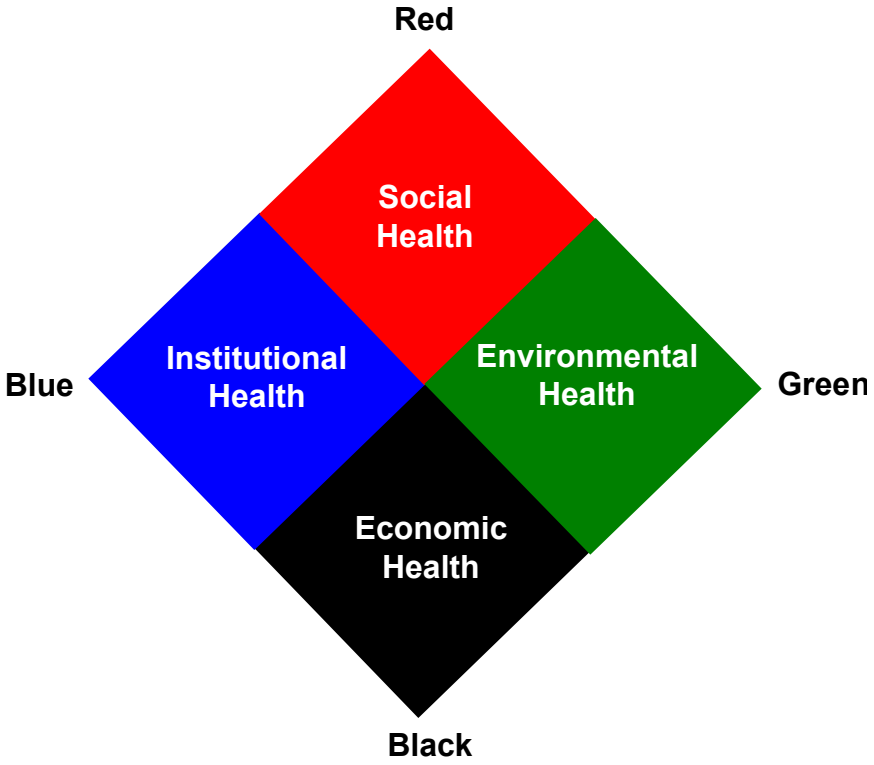
They are (1) human behavior or culture (2) the environment (3) commercial activity and (4) institutions or government. To grossly simplify, our behavior/culture impacts the environment; environment impacts commerce; commercial activity induces institutions/governments to respond; and those responses influence our behavior/culture. Embedded into these interaction are constant education and research, The notion is that when these forces are positively reinforcing, and when they offer a balance and sustainability, then we create the climate for prosperity and quality of life.



We know that sounds awfully academic. It is not.

If we could use colors - we would use red (social); green (environment); black (economic); and blue (institutions). Then we could use a clever phrase like "Sustainability seeks a sustained improvement of quality of life through a balanced approach to green policy that allows companies to stay in the black without citizens to see red or making institutions blue."

Once we "put a face on it" and start talking about examples like Tar Creek, the Illinois River, agriculture (our two "white meats" of chicken and hogs), ozone alerts, aquifer depletion and air quality, "brownfields" and more – well, we think that you will be very interested and intrigued with the public policy possibilities.

This is our 4th Town Hall. While the Academy has sponsiored annual conferences since 1985, this is our fourth effort in this Town hall format. We love it - and are refining our model every year. Prior year Town hall participants hav eboth cherished the experience and have told us they are "wrung out" after two and one-half days or participatory debate. But it is a GOOD "wrung out".

Here's trusting that you will have a great Town Hall experience, and that we will "wring you out" also!. We'll see you in Norman.

River Projects Envisioned

Brian Barber, Tulsa World, August 11, 2004. Printed with permission from World Publishing Company
Indian Nations Council of Governments; and Carter-Burgess (Dallas, TX)

Editor Comment:
This article was included to provide an example of SmartGrowth and development that is intended to balance behavior, environment, commercial and regulatory interests. While it is a "Tulsa-deal" - the principles apply statewide. It is an excellent example of trying to "pursue a resonsible balance" between our economic and environmental interests.

Seven low-water dams, several bridges and a Riverside Drive West are included in the Arkansas River vision plan that will be presented to officials beginning Wednesday.

The preliminary plan is based on a series of public workshops that were held earlier this year in the Tulsa area, said Kevin Conner, a senior project manager for Carter Burgess, the firm that was hired to help develop the 42-mile river corridor.

"We talked to many people who have very strong ideas about what they ultimately would like to see happen to the Arkansas River," he said.

"Some were very concerned about economic development, while others were more concerned about environmental issues. We tried to strike a balance between the two."

The plan will be presented Wednesday to the Arkansas River Corridor Steering Committee, which includes Mayor Bill LaFortune and community leaders.

It will be delivered Thursday to the Indian Nations Council of Governments' board of directors for approval.

At that point, the second phase, led by the U.S. Army Corps of Engineers, will begin and put the vision plan to a reality test over the next nine months.

Officials from the Indian Nations Council of Governments (INCOG) and Carter-Burgess, organizations have been charged with developing a master plan for the 42-mile stretch of the Arkansas River running through Tulsa County. The first phase of the study is designed to collect wide-ranging input from throughout the Tulsa region and craft a citizen-based vision for the river. The most promising ideas will consider elements of environmental quality, economic development and social well-being. The first "visioning" phase is expected to conclude in June.

"That's when we'll really look at the technical side of the plan and determine what's feasible, along with the costs and the priorities," INCOG Executive Director Jerry Lasker said.

"It's been 35 years since we had a plan for the river, so I'm hoping that it generates a lot of excitement," he said. "I'm very optimistic about it."

Low-water dams: Among the highlights of the vision plan is the addition of seven low-water dams to give the Arkansas River what it so often lacks -- water.

"That was a regular complaint that we heard from the public," Conner said. "People want to see water in the river, not sandbars."

About $5.6 million from the Vision 2025 county sales tax will provide funds for at least two low-water dams, but Conner said more will be needed.

"To have the kind of activity and development we want to see along the Arkansas River, it is crucial to have a water level that is reliable," he said.

The spots identified in the plan for low-water dams are only suggestions and may not turn out to be good sites after further study, Conner emphasized.

Bridges: The plan also calls for more bridges to help motorists and pedestrians cross the Arkansas River.

There are already two proposed bridges in the works, including a bridge that is supposed to cross at about 57th West Avenue and a Yale Avenue toll bridge that is supposed to cross at 121st Street.

But Conner said there is also a need for one at about 41st Street to help local traffic.

"Right now, if you want to drive across the river at the middle point, you have to get on Interstate 44," he said.

It is also hoped that pedestrians and bicyclists will have crossing areas on the bridges since the pedestrian bridge at 31st Street is so heavily used, Conner said. "We don't want the river to be a barrier to anyone," he said.

Riverside Drive West: The vision plan also includes an expanded Riverside Drive and a companion street on the other side.

A widened Riverside Drive has long been in the works for Tulsa, Conner said. But major signaled intersections at 21st and 31st streets should be added to help pedestrians cross.

Riverside Drive West, extending from Southwest Boulevard to 71st Street, is needed to help traffic flow north and south on the west side. "Right now, there's really no way to do that without jumping on an expressway," Conner said.

It is also recommended that Avery Drive, on the west side, be designated as a scenic parkway and that a trail be added for recreational use.

Trails: The preliminary river plan also recommends extending the network of bicycle and running trails along the entire corridor. About $5 million in Vision 2025 funds have been set aside to add trails.

It is also suggested that old Oklahoma 51 be designated as a scenic bike trail.

Protect Nature: The plan emphasizes that the natural features in and around the Arkansas River, including Turkey Mountain, Chandler Park and the bald eagle and least tern habitats, must be preserved.

"Turkey Mountain and the bike trails have as much to do with quality of life as economic development," Conner said. "We want to tap into the potential of the river without destroying its beauty."

It is also important that the proposed low-water dams allow for fish passage and sediment transport, the plan indicates.

Other Recommendations: The preliminary river plan suggests architectural "gateways" be added along Riverside Drive to designate different areas of the city.

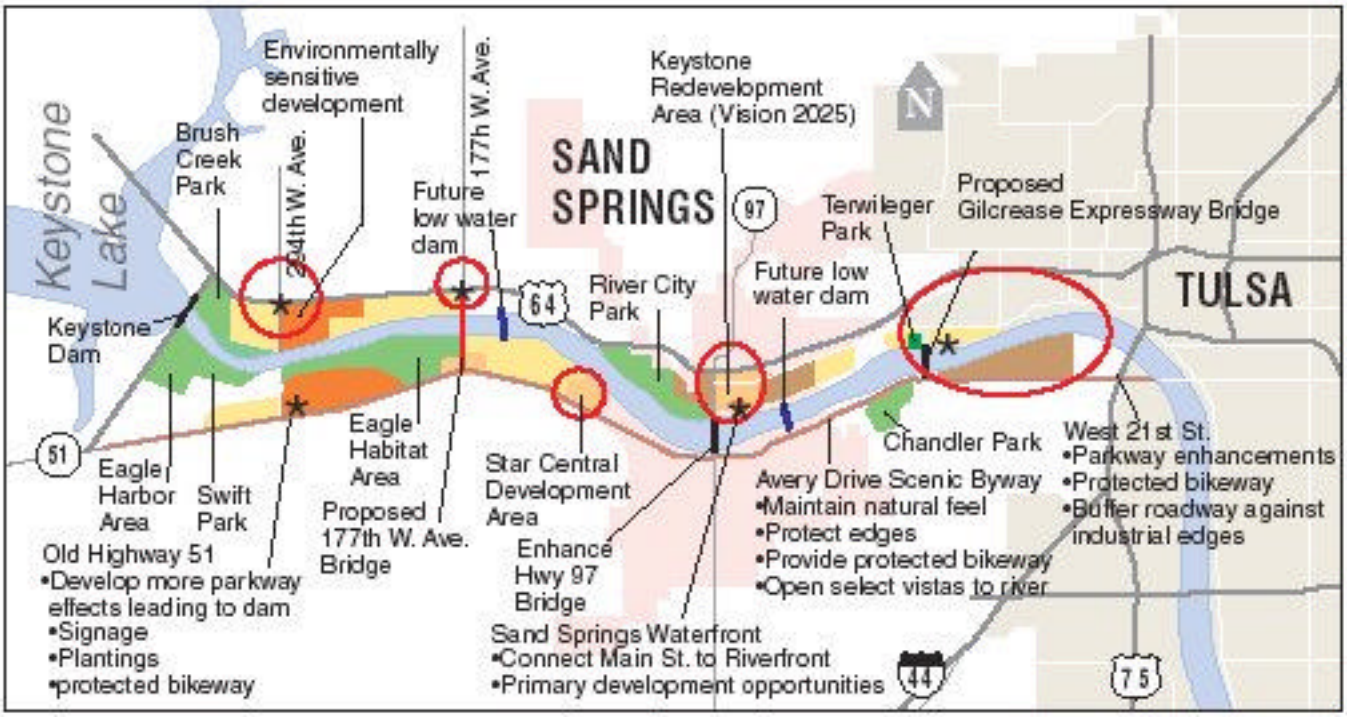
Also, much thought must be given to the use of the land along the river, according to the plan.

Moving the city's Public Works maintenance facility, which sits along the river at West 21st Street, and adding an activity generator like a new baseball stadium or entertainment center, would spur development.

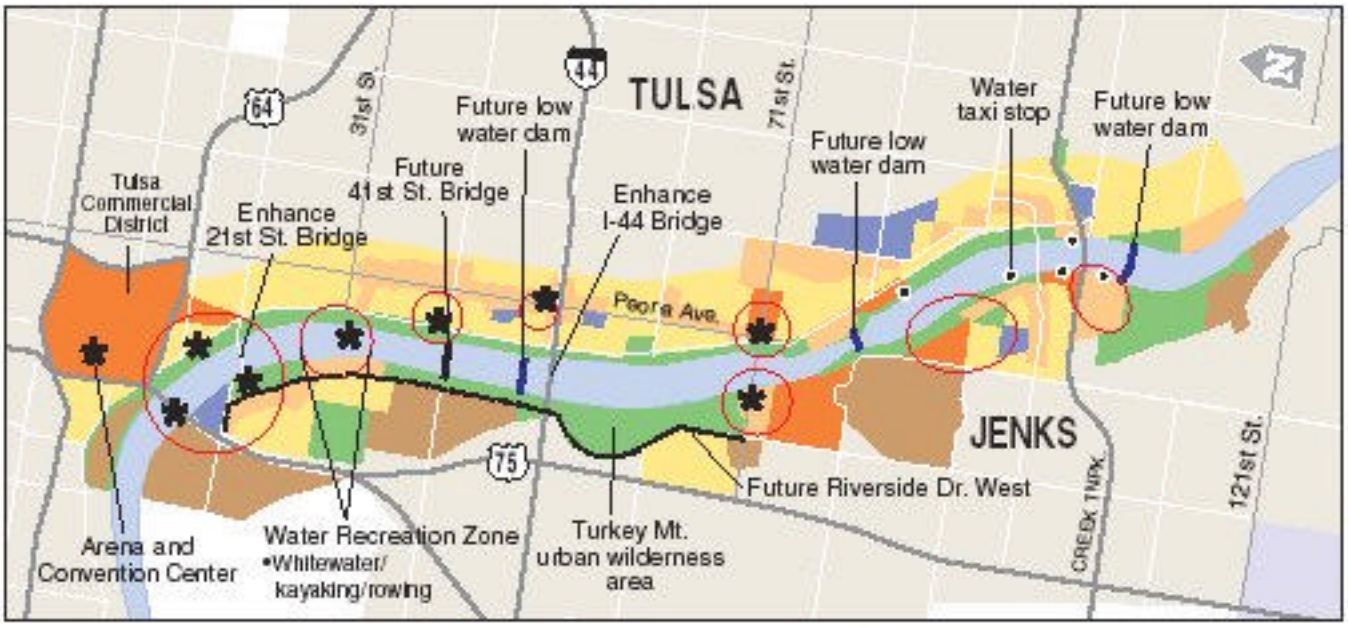
Over time, the refineries within the corridor, including Sunoco and Sinclair, may become obsolete and could provide additional land for development, the plan reports. If that happens, steps must be taken to assure proper remediation of the area.

The Arkansas River Corridor Study

Indian Nations Council of Governments and Carter-Burgess



Indian Nation Council of Governments (www.incog.org)



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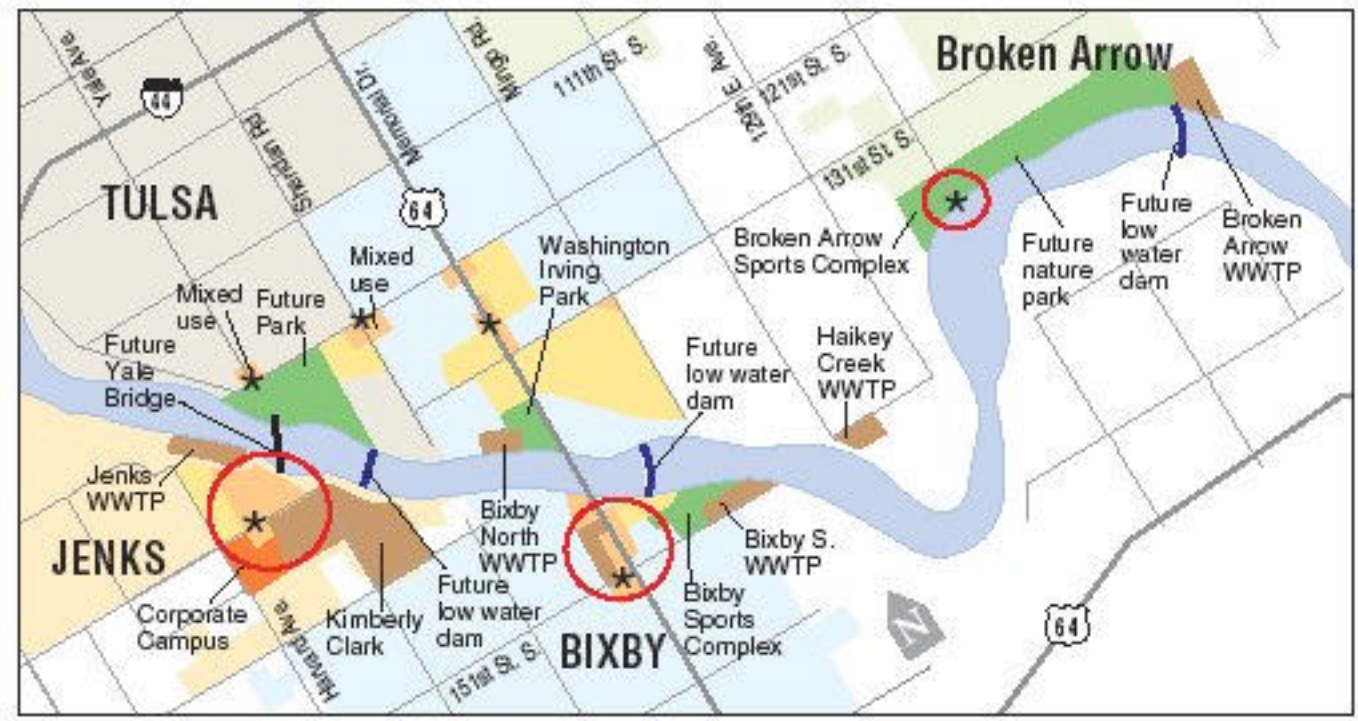
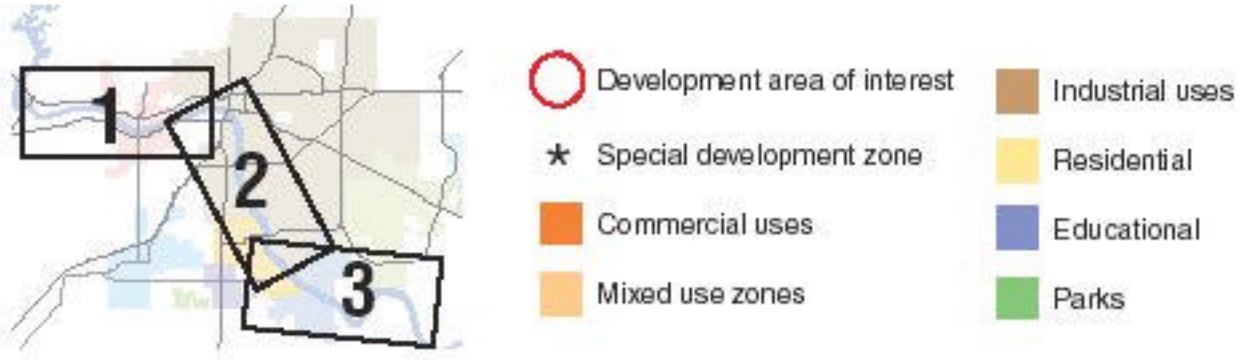


Carter-Burgess (www.c-b.com)



Moving Toward Sustainable Progress

Will Focht, Ph.D., Director of the Environmental Institute and the Environmental Science Graduate Program; Associate Professor of Political Science, Oklahoma State University

The Challenge to Progress

Well-meaning people from across the ideological spectrum can become frustrated in policy discussions about how Oklahoma should progress. It would thus appear that forging consensus on a roadmap for the future may be enormously difficult due to persistent conflicts over ends and means.

For example, some of those most concerned about economic progress loathe the positions advocated by environmentalists as anti-liberty and even anti-American.

- Some environmentalists counter that pro-economic interests are insensitive and selfish.
- Many businesses fear Tribal sovereignty claims that extend to primacy in environmental regulation as anti-competitive and ruinous to planning.
- The public is concerned about security, environmental quality, and economic growth in the face of uncertainty and bureaucratic ineffectiveness.
- Bureaucracies respond that it is difficult to be effective in the face of shrinking budgets and fragmented regulatory systems.

Many Oklahomans are wondering if the problems that face us can ever be solved, given powerful special interests. What may be needed is a shared vision that can show the way to progress that can enjoy broad support and draw people of varying ideological persuasions together.

This paper presents one possible conception of this vision.

1. The next section suggests a goal that can unite Oklahomans in their search for progress.
2. The second section outlines a means to achieve that goal.
3. The third section combines the ends and means in a conceptual model of sustainability.

The paper concludes with suggested topics for discussion in the Town Hall meeting.

Search for a Common Vision

It is best to begin by identifying a common vision that can aid our search for consensus on the goals of progress. Certainly, we would agree that progress should strive for a satisfactory quality of life. While we may disagree on the details of what is meant by "quality of life," most of us would not object to Aristotle's claim that people desire conditions that enhance human flourishing – in short, *prosperity*.

Prosperity, of course, requires consideration of a wide variety of potentially competing needs. Again, referring to the Classical Greek period, the Epicureans sought a hedonistic balance among needs. They recognized that seeking pleasure or avoiding pain too aggressively can jeopardize happiness. They sought a balance among competing needs. Their argument appears relevant today as people seek appropriate balances between security and privacy, economic growth and environmental quality, social order and individual freedom, collective welfare and personal achievement, and technical effectiveness and economic efficiency – to name but a few.

It is likely that we also can find consensus that prosperity based on balance should be assured over the long term. People want sustained improvement

in quality of life, not short-term improvements that yield long-term losses.
Finally, consensus likely can be reached that the pursuit of prosperity should be equitable and fair. In other words, prosperity should not be gained by the few at the expense of the many. Moreover, in keeping with the goal of long-term progress toward prosperity, the quality of life of future generations should not be sacrificed to benefit the current generation.
We can conclude that substantial consensus is likely that progress should embrace the following goals:

Prosperity: progress should strive toward improving the conditions necessary to human flourishing, social well-being, and quality of life

- Balance: progress should seek appropriate tradeoffs between and among competing needs

- Sustainability: progress should continue over the long term

- Fairness: progress should be equitable among people and across generations

In sum, the vision that can guide progress in Oklahoma should seek a sustained, balanced, and fair improvement in prosperity. As it turns out, this vision is at the core of what is meant by sustainable development.

The most commonly cited definition of sustainability was offered in 1987 by the Brundtland Commission: "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs." This definition explicitly acknowledges the long-term, balanced, and fair pursuit of prosperity that is a fundamental aspect of all sustainability definitions. Notice that it does not tip the balance in favor of any one aspect of quality of life at the expense of another.

Organizations – both public and private – have been talking more and more about sustainable development, sustainable economy, sustainable growth, smart growth, and environmental sustainability. It appears that these terms are now being subsumed into the common term, "sustainability." We can thus propose that the vision that should guide progress in Oklahoma is one of sustainability. Figure 1 depicts the sustainability vision of progress.

Figure 1
The Sustainability Vision of Progress toward Prosperity

Criteria of Sustainable Improvement to Prosperity
Let's explore what is meant by sustainability in more detail. A sustained, balanced, and fair pursuit of prosperity is certainly not limited to economic wealth. It is intuitive to most of us that quality of life also entails environmental quality. The balance between economic growth and environmental quality was the foundation of the United Nations Council of Environment and Development meeting in 1992 (the Rio Conference).

More and more people, however, recognize a third criterion of sustainable prosperity. Though details vary, consensus is emerging that social needs are also important. Some argue that the primary social concern that sustainability should address is social

justice or social equity. Others argue that social needs extend beyond social justice to include social order and social acceptance.

The addition of this third criterion is sometimes referred to as the "triple bottom line:" economic wealth, environmental quality, and social acceptance.

The triple bottom line conception, however, ignores an important fourth criterion: the role that policy institutions must play in achieving sustainability. For example, a policy that seeks to ensure environmental quality, encourage economic growth, and gain public acceptance can still fail if the institutions that are responsible for implementing the policy cannot effectively do so.

Sustainability should be envisioned as a four-criterion construct focused on health – it seeks sustained improvement to prosperity through fair balancing of environmental health, economic health, social health, and institutional health. A policy that seeks sustainable progress in improving prosperity therefore must seek a fair, long-term, and appropriate balance among environmental quality, economic growth, social support, and institutional capacity.

Figure 2 portrays the four criteria that are essential to sustainable improvements to prosperity as a diamond balanced on a corner.

Notice the use of colors in Figure 2 on your supplemental handout. The choices were intentional.

The diagram can be summarized as: "Sustainability seeks a fair and long-term improvement to prosperity through a balanced approach to **green** policy that allows companies to stay in the **black** without citizens seeing **red** or institutions becoming **blue**."

Achieving Sustainability

Agreement on sustainability goals, though essential, should be accompanied by an agreement on a means to achieve that end – at least on a level that recognizes the relationships among what humans do, how their activities affect sustainability, and how policies can encourage behavioral changes that are more sustainable.

A simple explication of these relationships is shown in Figure 3. Note that the eight activities are linked in a circular fashion.

Figure 2
Four Criteria of Sustainable Improvement in Prosperity

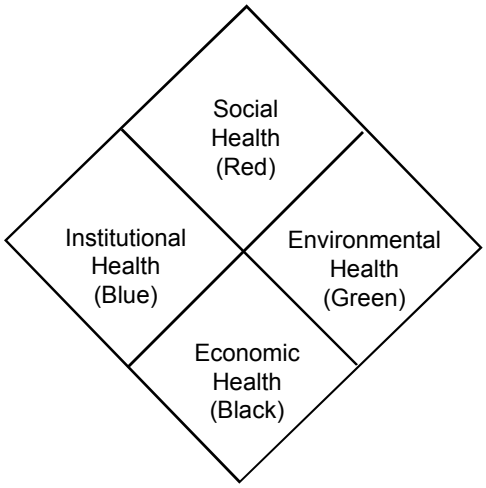
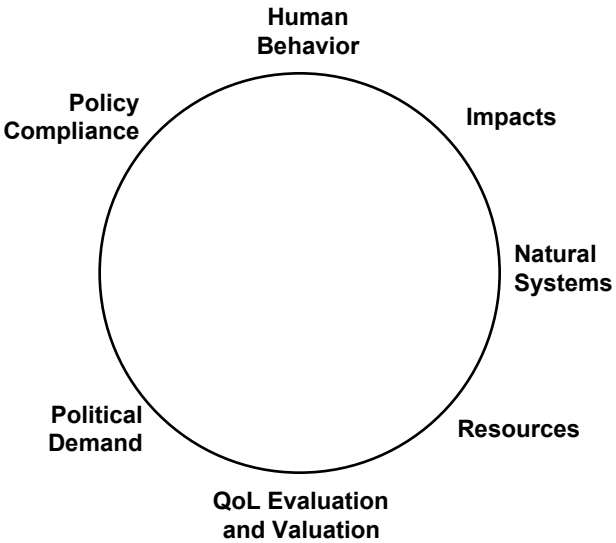


Figure 3
Elements Involved in Achieving Sustainability



To explain this cycle of relationships, let's start at the top of the figure with human behavior and then proceed clockwise. What humans do with respect to land use, resource use, waste management, and so on generates impacts that affect the natural environment. The natural environment generates resources upon which humans rely to improve their prosperity.

The value of these resources to humans depends on whether they are satisfied with their current quality of life. If they are dissatisfied, they will demand that policies be formulated to improve prosperity, which may include measures to alter resource use. Policymakers respond to political demand for change by formulating policies to improve prosperity.

Compliance with these policies will change behavior and thus lessen impacts on the natural environment.

These relationships suggest that the cycle would continue until satisfactory prosperity is reached and political demand for policy change approaches zero. However, the definition of prosperity changes over time with changing circumstances, which means that the cycle will likely continue indefinitely.

Nevertheless, informed sustainability policy will lessen political demand through adaptive policy change and thus avoid the dramatic and disruptive changes that may be required should political demand escalate to extreme levels as a result of widespread dissatisfaction with quality of life.

A Conceptual Model of Sustainability

We can now combine the three figures developed so far to produce a coherent model of sustainability that combines means and ends. The conceptual model will relate the vision and goals of sustainability, its four dimensions, and the means to achieving sustainability. Figure 4 depicts this model.

Notice that the primary goal of sustainability – improved prosperity – is situated in the center of the model. Prosperity is supported by its four health criteria: social support, environmental quality, economic growth, and institutional capacity. The eight-step means to achieve sustainability is arranged around prosperity and its four supporting criteria.

Note that impacts on natural systems and the resources that are generated by natural systems are closely aligned with environmental health. Economic health, in turn, is closely related to the valued resources used to improve quality of life and demands for policy change should quality of life be judged inadequate.

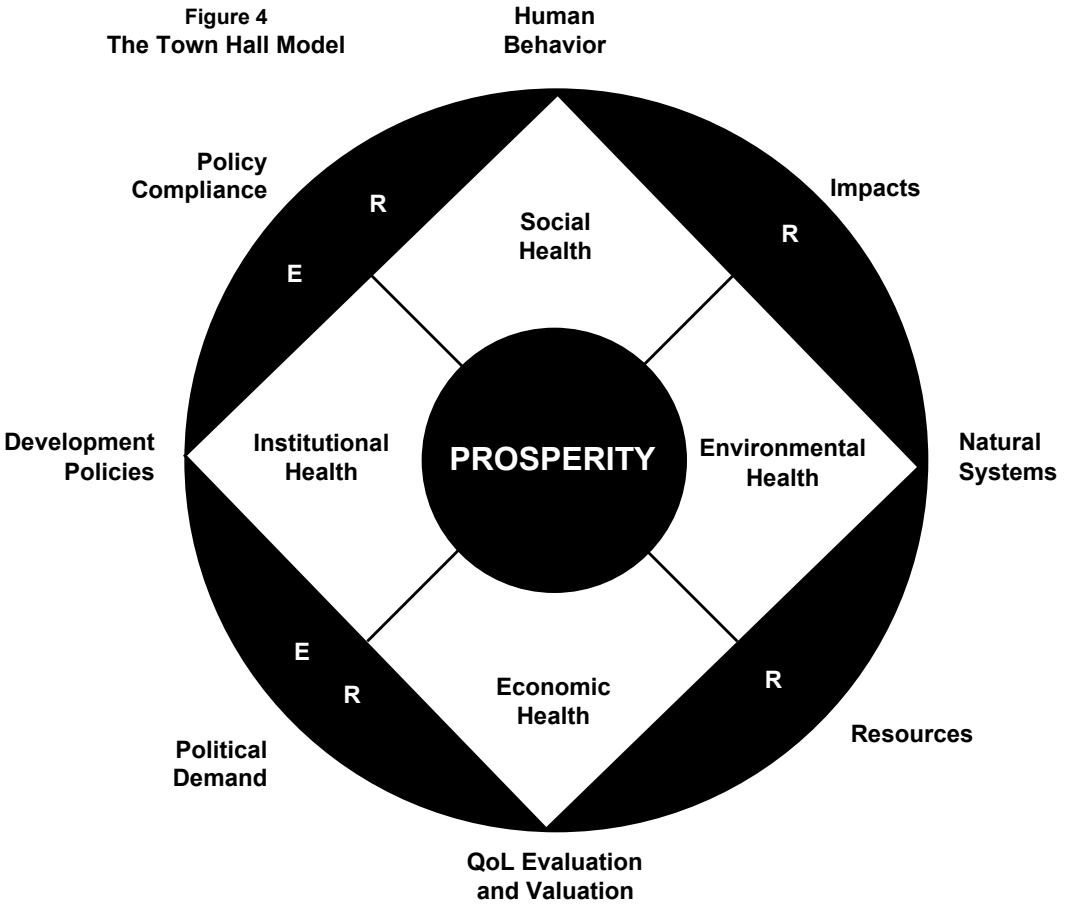
Institutional health is closely related to demands for policy change, the policy responses made in response to those demands, and the implementation of policies designed to encourage compliance.

Finally, social health is related to stakeholders' willingness to comply with policy programs, the changes in behavior induced by compliance, and the changes in impacts generated from changes in behavior. These relationships link the means to achieve sustainable progress with the criteria that support and define sustainability.

Figure 4 also includes small arrows labeled "R" and "E" for "research" and "education," respectively. These arrows are added to emphasize that policy learning is critical to sustainability success. To ensure that appropriate progress decisions are made, it is important that both policymakers and stakeholders learn about how sustainability policy can be formulated and implemented. First, relevant experts must obtain accurate information about the relationships between human and natural systems through expert analysis and research.

The findings of this research should then be used to educate policymakers and stakeholders on (1) the value of natural systems and the good and

Figure 4
The Town Hall Model



services they yield to meet quality of life aspirations (which influences demands for policy change), (2) the anticipated and actual effects of sustainability policies on improving quality of life, (3) how compliance with sustainability policies can be improved, and (4) how behavior can be appropriately modified to achieve sustainable prosperity.

Discussion Recommendations

Sustainability requires understanding of the relationships among policy decisions, the willingness of stakeholders to comply with these decisions to appropriately modify their behavior to reduce impacts on ecosystem structure and function, which in turn will increase the goods and services (natural capital) that are valued by stakeholders to improve their quality of life and thus contribute to their evaluation of quality of life, which will reduce their demand for continued policy change. It also requires that both policymakers and stakeholders become educated about these relationships and participate in a process that moves toward enlightened sustainability. Obviously, policy learning will occur through successive policy iterations over time. Purposive policy learning is the cornerstone of what has become know as "adaptive management." Adaptive management requires the development of a plan with opportunities for controlled policy learning built into the plan. Such a plan maximizes learning, which will lead to greater sustainability improvement with each iteration of the eight-step cycle.

To help improve the value of the Town Hall meeting, the following topics are recommended for discussion.

1. *Does Oklahoma need a coordinated, comprehensive plan for sustainable progress? Should this plan incorporate adaptive management principles to maximize policy learning?*

2. *What are the impediments to development of a sustainable progress plan? How can these impediments be addressed?*

3. *What research is necessary to understand better the impacts that humans have on natural systems and the effects of those impacts on the provision of natural resources upon which we rely for improved quality of life and prosperity?*

4. *How can we best encourage Oklahomans to appropriately value natural resources and appreciate their importance in long-term sustainable prosperity?*

5. *How does resource valuation affect political demand for policy change? How can a better link among resource valuation, quality of life evaluation, and political demand be established?*

6. *How can we encourage policymakers to be more responsive to sustainability policy demand and principles?*

7. *How can we encourage better compliance with sustainability policy?*

8. *How should we measure progress toward sustainability?*

9. *What do policy institutions need to assure sufficient capacity to formulate and implement sustainability policy?*

10. *How can government and the private sector best work together to achieve sustainability?*

11. *How can universities better support sustainability research? How can research partnerships best be formed among universities, government, and the private sector?*

12. *How should education about sustainability best be achieved at all levels (from K through Gray)?*

Smart Growth: Investing in Oklahoma

Susan Savage, Secretary of State and former Mayor of Tulsa

We asked Susan Savage to be our lead contributor because of her practical and politcal experience in dealing with sustainability at the local. regional, state and national level. Her credentials and other "bona-fides" are below:

- Led Tulsa's environmental efforts to improve water quality, stormwater management, solid waste, air quality, waste water, transportation and the associated regulatory requirements for nearly a decade as mayor.

- Worked with EPA Administrator Mary Nichols and Region VI Director Gregg Cooke to develop innovative approaches for city governments to improve air quality including FAR (Flexible Attainment Region) and Ozone Flex.

- Appointed by President Clinton to represent local governments on the President's Council on Sustainable Development.

- Appointed by President Clinton to the National Recreation Lakes Commission--a study of federal lakes.

- Led the nation's mayors during the final stages of negotiations over the 1996 Safe Drinking Water Act amendments.

- Presided as Chair of the US Conference of Mayors Energy and Environment Committee, 1996 & 1997 where numerous issues pertaining to the environment, energy policy and sustainable development were presented to the President and Vice President.

- Guided the development of the mayor's first comprehensive brownfields policy embraced by Congress in enacting the "Small Business Liability and Brownfields Revitalization Act."

- Testified before Congressional committees on clean air standards, non-point source pollution, water quality and other environmental issues; represented Tulsa nationally as a speaker on issues related to economic growth and environmental stewardship.

- Demonstrated policy and regulatory innovations that served as national models for other cities and regions, including agreements with industry and state officials on policies to protect municipal drinking water supplies.

- Participated in the formation of the Joint Centers for Sustainable Communities--a collaboration between mayors and county officials to advance economic and environmental best practices and policies to promote sustainable development.

- Through partnerships with the AIA, sponsored and held three urban design/smart growth summits in Tulsa resulting in policy changes in codes, infill development, and neighborhood revitalization.

Sustainable Development
An internet search of the words "sustainable development" and""smart growth" yields 4.7 million and 3.6 million hits respectively. In many contexts, these words have become ingrained in public policy parlance. While a vocabulary around sustainable development and smart growth has developed, in practice, they represent a way of thinking and doing business that are more than descriptive or conceptual.

Cities, counties and towns who necessarily must view development on a regional basis, understand that issues of growth, sustainability and quality of life are issues of balance and proportion and resource allocation. Sustainable communities are created only when there is a comprehensive approach to the economy and jobs, the environment, and issues such as education, transportation, public safety, public access and the growing disparity in incomes.

It has been said that "to be young is to enjoy the shade from trees you did not plant. To be mature, is to plant trees for shade you will never enjoy."

Linkages
Economic growth, environmental protection, and social equity are essentially linked and cannot be viewed in isolation. While embracing the need for growth and change in our state, developing long range strategies for the sustainability of the choices that are made will ensure the natural and built environments retain livability standards for generations to come.

Today, a shift is occurring in the decisions people make about where to live through the explosive application of technology to virtually every type of job and through the shift from a manufacturing economy to an information economy. People now have more choices about where they can and will live.

This shift is profound. The information economy requires an inventory that takes almost no storage space, can be created anywhere, can be transported instantly and cheaply, and can be adapted, expanded and modified at will. Life in our communities, whether urban, suburban or rural is changing as a result of it. Quality of life, livability and our ability to connect as people within our chosen communities require us to think more comprehensively about how we design and shape the physical space—about how we achieve and sustain a high standard of living and turn a location into a place.

Smart Growth
Sustainable development or smart growth means that decisions are made now which enable the interests of future generations to be protected. Sustainable development requires a view of issues which extends beyond the immediate short-term interests to what makes sense over time—to take available resources and reuse, regenerate, recycle and reenergize them in a comprehensive way; to put aside parochial issues of control and to develop partnerships among many diverse interests. A sustainable place—whether it be a community or many communities or a single state or region—is one in which its leaders and residents develop an attitude, an approach, a way of doing business that is incorporated as a standard.

For community leaders and public policy activists, there is no other concept that makes sense. The decisions that are made today set the tone and course for our communities , our state and our future. A Native American proverb reminds us that "every decision must take into account its effect on the next seven generations."

Increasingly, the metropolitan or regional economies within and abutting Oklahoma are the economic engines driving our state's economy. The continued livability of central cities has been greatly challenged; the ring around those central cities which are aging suburbs and the sprawl into the rural areas of key regions of our state offer substantial reasons to examine Oklahoma's growth

and development patterns. It has been said that sprawl is created by those seeking to escape sprawl. Yet, development sprawl and its historic by-products, decline and neglect of what is left behind, present renewed opportunities to change, innovate, improve and optimize Oklahoma's future.

The following examples offer very tangible illustrations of the complicated nature of smart planning and growth and the complexity of finding common ground.

Water Quality & Use

Water quality and the use of water in Oklahoma have emerged as a key issue that requires the participation of federal, state, tribal and local governments to address.

Communities, local economies and citizens can do without many things and many types of government services, but clean, safe, available drinking water is not one of them.

Clean, reliable sources of raw water and treatment and distribution systems are important to citizens and to local, regional and state economies.

Degradation through point source and non point source pollution of water supplies impacts those economies, increases treatment costs, and negatively affects tourism. Oklahoma has the third largest number of federally owned lakes in the country regulated by nearly a dozen different federal agencies with few common primary purposes.

Many of the federally owned lakes were built for flood control and are now raw water source lakes; all of them have demands as recreational venues; yet these uses can come into conflict.

Municipalities own raw water lakes that are outside their corporate boundaries, yet serve communities throughout regions of the state. Rural water districts and tribal governments have certain rights under federal and state law to water bodies and treated water. How do officials at all levels create a framework to meet the water needs of our communities in a way that makes sense and balances economic prosperity, environmental stewardship and social equity to the benefit of Oklahomans? Water knows no political boundaries. It is a resource that belongs to all of us requiring a comprehensive strategy to ensure its protection and availability at an affordable cost.

"The fundamental lesson that nature teaches, and will repeat patiently for the slow learner, is that the rivers and creeks own the floodplains."
Jim Sellars - May, 1994

Floodplain Management

Floodplain management in Tulsa is an example of correcting a problem in a sustainable way that has enriched the community, improved public safety, created greenways and multi use recreational facilities for all citizens, and reinforced the value of smart growth and development.

Post-war growth and sprawl turned floodplain parks in Tulsa into watercourses that were paved and piped and covered with concrete and development. By mid-1980, Tulsa County was included in the records books as America's most frequently flooded community, with nine federally declared disaster declarations in fifteen years.

When Tulsa's 1984 flood left fourteen people dead, damages to 7, 000 buildings, and costing hundreds of millions of dollars, government and community leaders took charge.

Throughout the next two decades, Tulsans invested local, state and federal tax dollars and built scores of flood control projects with the primary goal of retrofitting a drainage system. This effort has received national and international recognition for community planning and resulted in flood insurance rates that are among the lowest in the nation.

Tulsa has remained essentially flood-free in these areas while the open spaces have enhanced the community's quality of life.

Other Issues

There are many, many issues of smart growth and sustainability throughout our state in our cities and towns in addition to the two listed above—transportation choices and land use planning, growth policies that foster livable communities, access to and protection of open space for all citizens, protection of farm lands, solid waste collection and disposal, air and water quality, infill development in areas where the infrastructure is in place, education and training, job growth and development, affordable housing, and energy sources and consumption.

Why Smart Growth Matters

Smart growth need not equate to no growth—in fact smart growth is planned growth. It suggests a process to decide how we will choose to live, work and recreate among diverse people in a very diverse state. There are great opportunities for us to integrate the enormous socioeconomic, technological and global forces that are altering our lives for the future. As Oklahoma moves closer to its 100th anniversary, it seems fitting to consider our history and future. How have we grown? What are our strengths and weaknesses?

As citizens, as Oklahomans, each of us can embrace the call to action to craft a healthier, more vibrant and livable state for the next 100 years. Building sustainable communities through careful thought and action are keys to optimizing our future.

It has been said that "to be young is to enjoy the shade from trees you did not plant. To be mature, is to plant trees for shade you will never enjoy." Harnessing the great natural and human resources of this state will enable us to preserve, improve and ensure the sustainability of life for all Oklahomans.

CONSIDER

... water, flood control, transportation, land use, growth policies, open space, farm lands, solid waste, air quality, infills, education and training, job growth, housing, and energy ...

Smart Growth: Investing in a Better Future

A Review of the Fiscal and Competitive Advantages of Smarter Growth Development Patterns by Mark Muro and Robert Puentes, March 2004. Printed with permission from The Brookings Institution

With the collapse of the 1990s stock market bubble and several years of national economic slowdown, a tense new climate of austerity has sharpened debates over government spending, economic development, and the physical growth of states and metropolitan areas.

Leaders in this environment are eager for fiscally prudent ways to simultaneously support their communities and stimulate their economies.

This paper makes the case that more compact development patterns and investing in projects to improve urban cores would save taxpayers' money and improve regions' overall economic performance. To that end, it relies on a review of the best academic empirical literature to weigh the extent to which a new way of thinking about growth and development can benefit governments, businesses, and regions during these fiscally stressed times.

Overall, the review finds that:

- **The cost of providing public infrastructure and delivering services can be reduced through thoughtful design and planning.**

  Several studies suggest that rational use of more compact development patterns from 2000 to 2025 promise the following sorts of savings for governments nationwide: 11 percent, or $110 billion, from 25-year road-building costs; 6 percent, or $12.6 billion, from 25-year water and sewer costs; and roughly 3 percent, or $4 billion, for annual operations and service delivery. School-construction savings are somewhat less.

- **Regional economic performance is enhanced when areas are developed with community benefits and the promotion of vital urban centers in mind.**

  Studies show that productivity and overall economic performance may be improved to the extent compact, mixed-use development fosters dense labor markets, vibrant urban centers, efficient transportation systems, and a high "quality-of-place." Productivity increases with county employment density. Communities that practice growth management realize improved personal income shares over time.

- **Suburbs also benefit from investment in healthy urban cores.**

  Finally, studies suggest that to the extent these smarter development patterns foster equity in regions by improving center-city incomes and vitality, they will also enhance the economic well-being of the suburbs as well as the city. City income growth has been shown to increase suburban income, house prices, and population. Reduced city poverty rates have also been associated with metropolitan income growth.

In the end, this paper makes the case that during times of tight budgets, more efficient and beneficial growth strategies make more sense than ever. As these strategies become more widespread, the challenge for the research community will be to move beyond the obvious fiscal savings and continue to quantify the profound effects on economic competitiveness, equity, and quality of life available through better planning and community design. In the end, these issues are at the crux of what better development is really all about.

INTRODUCTION

Are bad times potentially good times for smart growth?

Do tight budgets and a spotty economy make this the right time—rather than the wrong time—to look at getting the most benefit for development efforts? On the face of it, the argument that curbing sprawl and fostering more efficient compact development can help governments economize and businesses and regions prosper appears powerful.

Efficiency has always been a core promise of smart growth. For years, the move to more compact settlements has held out the possibility of saving taxpayers some of the cost of building infrastructure serving new development far from traditional population centers. And yet, this dollarwise aspect of the movement to create developments of greater benefit to the community has received little attention in recent years—a period, by no coincidence, of unprecedented economic prosperity and budget surpluses.

Instead, during the good years, smarter growth was mostly pursued as a quality-of-life agenda aimed at enhancing the livability of suburbia.

Through the 1990s boom, the smart growth agenda was associated by turns with expensive state and local expenditures on farmland preservation, sizable open space projects, environmental protection, urban design initiatives, downtown revitalization, congestion relief, social equity discussions, and reducing school crowding. More recently an emphasis on human health and the reduction of obesity emerged. In short, while reformers continued to develop and advance fiscal and economic arguments for reducing population dispersal and revitalizing older neighborhoods, their greatest emphasis remained elsewhere.

But now this could be changing. With the collapse of the 1990s stock market bubble, the September 11 the terrorist attacks, the onset of economic sluggishness, and serious state and local budget deficits, a tense new climate of austerity has sharpened debates over growth, government spending, and economic development—and changed the calculus for reform. Most notably, the imperatives of controlling costs and jump-starting the economy have come to dominate the agendas of both governments and businesses, given that growth rates and tax collections may well remain depressed for several years or longer.

Businesses—struggling to restore pre-slump profit levels—are aggressively seeking creative ways to accelerate growth and promote efficiency. For their part, states and local governments—squeezed by record budget shortfalls—are looking desperately to curb wasteful spending. Suddenly, public officials are being forced to consider not just short-term budget cuts but policy reforms that will lead to long-term efficiencies. And no wonder: The states alone faced an aggregate $100 billion in budget shortfalls this year and last, thanks to a "perfect storm" of woes that includes a slow economy that has slammed tax revenues, soaring Medicaid expenses, and huge new security costs associated with the threat of terrorism. [1] Only Arkansas, New Mexico, and Wyoming say they will face no budget problems in 2004.

In this environment, it is inevitable that opportunities to rethink how communities grow, and how they invest public dollars, would get another look. And they are getting it. Notwithstanding their mostly rhetorical justifications for action, governors and advocates alike have begun to promote ideas such as the reuse of existing buildings, compact design to reduce infrastructure costs and traffic congestion, and limits on sprawl as a fiscal and economic tonic inhard times. "No longer should taxpayers be forced to bear the burden of new roads, schools, and sewers every time a McMansion is built or a mall is erected," declared Gov. James E. McGreevey of New Jersey last year, in the most direct gubernatorial embrace ever of smart growth as a fiscal remedy.

And a month later Maryland's former Governor Parris Glendening, now president of the Smart Growth Leadership Institute, connected the moment and the message in a conference speech. "The infrastructure costs savings associated with smart growth are more imperative as officials are forced to make tough funding decisions," asserted Glendening, who first popularized a fiscally oriented concept of growth in gaining passage of Maryland's 1997 Smart Growth Areas Act. "Sprawl is fiscally irresponsible," Glendening told a reporter. [2]

Other sitting governors have also made the connection. In South Carolina, Gov. Mark Sanford's Quality of Life Task Force found that in order for the state to deal with its $57 billion infrastructure deficit, state agencies and local governments will have to carefully plan and prioritize how infrastructure investments are made. [3] In Michigan, Gov. Jennifer Granholm created a land use leadership council based in part on the premise that rapid metropolitan decentralization "is hampering the ability of this state and its local governments to finance public facilities and service improvements" and is "creating a strain on the efficient provision of public services." [4] Granholm recently noted that encouraging more compact development patterns would help the state save money. [5]

All of which raises the question: Is it true? How much does unplanned growth cost and can governments really save money and jump-start economies by applying smarter ideas before approving the next development project? What are the facts of the case for looking at community growth needs and benefits as a budgetary and economic strategy? This paper addresses those questions. Prompted by the growing interest in the fiscal benefits of compact development patterns (as well as the persistent obscurity of relevant information on the question), this report seeks to weigh the extent to which supporting smart growth development patterns can be considered a way to be smarter with money. To do that, these pages survey the best academic empirical research literature probing the fiscal and economic implications of alternative land development patterns and conclude that, yes, thinking through growth and its impact on communities can save taxpayers money and deliver important benefits to business and regions.
The paper is organized as follows.

First, a brief initial section defines smart growth development patterns for the purposes of this review.

Next, it lays out the basic arguments for why compact, mixed-use development holds out important fiscal, economic, and community benefits.

A third section then reviews the evidence on the three major clusters of probable fiscal/economic gains identified by the literature—savings of public infrastructure and service costs, gains in private-sector economic development, and suburban prosperity benefits from reducing core distress.

Finally, the conclusion reiterates that, despite some caveats, supporting smarter growth development patterns amounts to smart policy for the smart money.

DEFINING SMART GROWTH

Broadly defined, "smart growth" refers to a new way of thinking about how communities, cities and towns, and entire metropolitan regions grow and develop. This new thinking asserts that current patterns of growth and decline are harmful to communities, undermine urban economies and broader environmental objectives and exacerbate deep racial, ethnic and class divisions. Smart growth proponents argue that these growth patterns, popularly known as "sprawl," are not inevitable but result at least in part from major governmental policies that distort the market and facilitate the excessive decentralization of people and jobs.

Almost never does smart growth mean no growth; instead, it entails accommodating it in a way that maximizes its benefits and reduces as much as possible its frequent negative side effects. More specifically, smart growth refers to an overall set of broad goals and policies designed to counteract sprawl. These usually include: (1) limiting outward expansion, (2) encouraging higher density development, (3) encouraging mixed-use zoning as distinct from fully segregating land uses, (4) reducing travel by private vehicles, (5) revitalizing older areas, and (6) preserving open space. Promoting more affordable housing may or may not be an explicit goal of smart growth programs.[6] In investigating whether smart growth saves money, the paper narrows the usual definition and makes at least one crucial assumption that some may find troublesome: It deems smart growth development patterns essentially a matter of two rather crude land-use characteristics—compactness and density.

This admittedly limited definition of smart growth is necessitated by the limited scope of the academic literature to date. So far, the economics-of-development literature has primarily focused on the fiscal implications of providing infrastructure and services under different physical patterns of development, whether spread-out or more densely clustered. Consequently, any assessment of the economic implications of smarter growth must begin with that work—and with a definition of—"smart growth" that reduces the doctrine's many dimensions to its simplest impact on the physical form of development. Clearly, this proxy definition fails to capture the full social, environmental, and design dimensions of smart growth, and leaves aside the much broader panoply of goals (such as transportation choice and social equity) and tools (such as open space preservation) that constitute the smart growth paradigm.

Nevertheless, this narrower emphasis clearly captures two fundamental tenets of smart growth. And it has the critical benefit, in lieu of abundant research on smart growth per se, of focusing on the elements of smart growth—compactness and density—that have been evaluated most thoroughly in the academic literature.

SMART GROWTH AS SMART MONEY

The case can be made, then: A portfolio of provocative evidence suggests quite strongly that smart growth has the potential to reduce governments' capital facility costs, reduce their costs of delivering services, and improve regional economic performance as well. Using the Burchell group's national projections, which reflect a single methodology and a national scope, it appears on the fiscal side that:

Capital facilities projects offer the largest promise for reducing the fiscal demands of development using smart growth. By the Burchell group's calculations, shifting to a modestly more compact development pattern could yield percentage savings in the low double digits (around 11 percent) from 25-year capital outlay estimates for roads and water/sewer lines. Road building savings are key. Nationally, road building promises almost 10 times the 25-year dollar savings ($110 billion versus $12.6 billion) and twice the percentage savings (11.8 percent versus 6.6 percent) of water and sewer link construction.

Operations/maintenance and service delivery spending, meanwhile, hold the potential for more moderate savings of perhaps $4 billion a year, or 3.7 percent, according to the same assessments. Over 25 years, however, these operational savings could begin to approach those to be wrung from local infrastructure costs.

Of these savings it can be said that they are solid, but not spectacular; long-term rather than immediate. That the American economy represents an $11-trillion enterprise (rising to $20 trillion in 2025) may help to put these meaningful but not massive savings in perspective. At the same time, econometric work suggests potentially more potent benefits of smart growth may accrue on the wider economic front:

Productivity and overall economic performance may be improved to the extent smart growth elevates regions' employment density and improves transportation efficiency

Likewise, regional and suburban prosperity may be increased to the extent smart growth improves the fortunes of the center city by channeling new development into urban cores These productivity, prosperity, and equity benefits of smart growth will become especially tantalizing as states and regions seek to enhance their competitiveness as the economy picks up.

Suggestions for Future Research

Of course, much more work needs to be done to strengthen the fiscal and economic case for smart growth.

On the fiscal side, while numerous studies suggest the benefits of more compact growth, the evidence remains hard to interpret, and harder to translate. The primary reason is that modeling dominates the literature and remains heavily determined by the parameters and definitions of the particular study. Case studies bring the models down to earth but remain strongly affected by factors specific to particular localities. Meanwhile, the absence of standardized measures of expenditure, service levels, sprawl, and "smart growth" make it hard to draw universal conclusions beyond the general conclusion that low-density-development is more expensive to support.

Generalizations are therefore difficult to make. For this reason, a crying need remains for a widely publicized, systematic, and authoritative synthesis and comparison of the best studies conducted in different states and regions. Similarly, it must be said that the prominence of modeling brings with it an air of the theoretical.

In this connection, Bunnell (1997) has rightly observed that for fiscal impact research to become more meaningful and educationally useful, "greater emphasis needs to be placed on empirical studies that examine actual patterns of development, in actual geographic and fiscal contexts." Such "reality-based" research—especially comparing differently planned neighboring communities operating under similar fiscal, tax, and service structures—would "tell the story" in a more tangible way.

Especially useful for those concerned with smart growth would be detailed fiscal studies comparing paragon smart growth communities with nearby traditional ones operating within similar tax, regulatory, and service structures. Clearly a shortcoming of this essay has been its reliance on studies assessing such proxy characteristics as density or compactness in lieu of the full panoply of "smart growth" characteristics, ranging from centeredness and walkability to mixed uses and transportation choice.

Similarly, the state of knowledge on aggregate economic impacts remains suggestive, but far from decisive. Complex statistical and mathematical analysis comes into play even more in this field, making its conclusions less satisfying. Some "findings" feel more like mathematical exercises than real-world empirical discoveries. And many studies—while intriguing—lack rigor. Cases in point are some of the studies asserting an association between smart growth-type urban interventions and enhanced economic growth on the basis of simple correlations.

As Pastor and Gottlieb caution, simple correlations cannot confirm the order of events. Already noted was the possible intrusion on such correlations of outside effects like a region-wide economic boom that lifted multiple cities and their suburbs. So too might a booming suburban economy drag a sagging center out of the doldrums and improve prosperity across the region, even though it might appear that core enhancement boosted the suburbs. Clearly the possibility of a relationship between urban form and character and overall economic performance must remain a major area of concerted investigation.

Moreover, the fiscal and economic benefit of numerous other aspects of alternative growth patterns remains unquantified. Suffice it to say that much more work needs to be done to evaluate the real fiscal and economic value of redevelopment and reinvestment; transit investment as compared to highway construction; mixed-use versus single-use development; conservation; and
historic preservation.

CONCLUSION

And yet, the dollarwise benefits of smart growth can clearly be affirmed. With governments, regions, and states under increased pressure to reduce costs and reenergize slumping economies, abundant evidence confirms that embracing smart growth can help on both scores.

Best known are the fiscal benefits. By concentrating households nearer existing infrastructure and service networks, the adoption of smart growth by municipalities and regions can reduce the costs of providing new roads, new water lines, and fire protection to a given number of new residents. Communities should in this fashion recognize that sprawl contributes to budgetary distress and that better managing development patterns can play a role in controlling rising costs and framing long-term solutions.

At the same time, though, newer research points beyond these likely incremental cost savings to a more speculative, more exciting, benefit. Smart growth, it seems, may also hold some power to enhance the performance of whole economies, as well as incomes across whole regions, including in the suburbs.

In this fashion, advocates of smart growth have before them a powerful insight that well complements their longstanding fiscal claims with a more alluring vision of enhanced prosperity. More and more, it looks they can answer the business elite's question, "What's in it for me?" with a confident "Plenty!"

1 *Christopher Hoene and Michael A. Pagano, "Fiscal Crisis Trickles Down as States Cut Aid to Cities" (Washington: National League of Cities, 2003).*

2 *Associated Press State and Local Wire,""Maryland's Ex-Governor Says Sprawl is Fiscally Irresponsible,"February 26, 2003.*

3 *"Quality of Life Task Force Final Report," Presented to Governor Mark Sanford, February 6, 2003. Available at www.state.sc.us/governor/reports.html*

4 *Jennifer Granholm, "Michigan Land Use Leadership Council / Michigan Department of Environmental Quality," Executive Order No. 2003-4, February 27, 2003.*

5 *Keith Schneider, "Turfism is an Anachronism: Granholm Responds to Council Report, Sets Priorities to Strengthen Cities, Lasso Sprawl," Great Lakes Bulletin News Service, November 4, 2003. Available at www.mlui.org/growthmanagement/ fullarticle.asp?fileid=16589.*

6 *See Anthony Downs, "What Does 'Smart Growth' Really Mean?" Planning, April 2001.*

Smart Growth Online
www.smartgrowth.org

"Breakfast from Arkansas"

Marty D. Matlock, PhD, Associate Professor of Ecological Engineering
and Robert A. Morgan , University of Arkansas; and Kent W. Thornton, FTN Associates, Ltd.

A Question of Degree

"Like winds and sunsets, wild things were taken for granted until progress began to do away with them. Now we face the question whether a still higher 'standard of living' is worth its cost in things natural, wild, and free. For us of the minority, the opportunity to see geese is more important than television, and the chance to find a pasque-flower is a right as inalienable as free speech.

These wild things, I admit, had little human value until mechanization assured us of a good breakfast, and until science disclosed the drama of where they come from and how they live. The whole conflict thus boils down to question of degree. We of the minority see a law of diminishing returns in progress, our opponents do not. One must make shift with things as they are…"

- Aldo Leopold, Father of the American Conservation Movement, from the forward to A Sand County Almanac[1]

Leopold's question of degree is the foundation for much of the conflict in conservation of natural resources in Arkansas. In many parts of the state, there remains no assurance of a good breakfast. Thus the tension between exploitation and preservation, with conservation somewhere in between, has been building for many decades in the Natural State. The approach being taken by Arkansans to sustain their natural resource base, social identity, and economic viability has been complex and understandably cautious. Let there be no doubt, there can be no ecological sustainability in Arkansas without economic viability. Arkansas' natural resource base is limited to agricultural and timber products, with very few non-renewable resources such as fossil fuels and metal ores. One of the most critical renewable resource issues facing Arkansas is water resource management, both in terms of quantity and quality. We will provide an overview of Arkansas' approach to managing water resources in Arkansas to illustrate the complexity of achieving sustainability at a State level.

Table 1
Arkansas' 2003 Gross State Product

Industry Category	Gross State Product (Millions)	Pct
Agriculture, Forestry, and Fishing	2,263	3
Construction	3,368	5
Finance, Insurance, and Real Estate	8,354	12
Government	8,876	13
Manufacturing	13,136	19
Mining	496	1
Services	11,514	17
Transportation and Public Utilities	7,216	11
Wholesale and Retail Trade	12,690	19
Total Gross State Product	**67,913**	**100**

The Arkansas Economic Base

"Where Our Breakfast Comes From"

Arkansas is teetering between a historically rural agrarian economy and an exploding metropolitan industrial economy.[2] Arkansas' population in 2000 was just over 2.7 million people, up 15.3 percent from 1990. Over 75 percent of those citizens live in or within close proximity to major metropolitan areas. Arkansas' Gross State Product was almost $68 billion in 2003, with manufacturing accounting for the largest share at 19 percent (Table 1). Agriculture alone only accounts for 3 percent of the Gross State Product. However, of the five largest employers in

manufacturing, Tyson Foods, Inc., ConAgra, Inc., Whirlpool Corporation, Georgia-Pacific Corporation, and International Paper Company, four are based directly upon processing of natural resources. Thus Arkansas' largest industry sector and source of revenues in 2003 was agricultural. In fact, manufacturing jobs have been declining in Arkansas since 1982, when they peaked at 28.4 percent. Those relatively high wage jobs have been replaced by predominantly lower-paying service sector jobs.[3]

Arkansas lacks the infrastructure for competing in the world market, according to the Progressive Policy Institute, which ranked Arkansas 48th in state preparedness for the global economy in 2002.[4] Adding to the mixed signals, the Corporation for Enterprise Development in 2003 graded Arkansas with a B in Business Vitality, but D's in Performance and Development Capacity.[5] The low grades in these two categories are notable because the state earned A's in both Employment (a component of Performance) and Amenity Resources (a component of Development Capacity), but was assigned F's in Equity (a component of Performance) as well as Human Resources and Innovation Assets (components of Development Capacity). Arkansas was ranked as the 47th most livable state in 2002 by Morgan Quitno Press,[6] yet the northwestern metroplex of Bentonville-Rogers-Springdale-Fayetteville was rated as the fastest growing economy in the nation during the third quarter of 2003 by the Milken Institute.[7]

As with most emerging economies, Arkansan's incomes are not equally distributed. The wealthiest 20 percent of Arkansans increased their annual income by more than $25,000 during the 1990s to nearly $105,000 while the poorest 20 percent saw their income increase only $3000 to just over $12,000 per year.[8] Despite the tremendous growth in Gross State Product over the past 10 years (more than 50 percent increase), the gap in income between the top and bottom 20 percent of incomes has not changed. The inequitable distribution of economic resources across the state further complicates statewide ecosystem management programs, because the poorest segments of the Arkansas population are predominantly rural and often depend on natural resources as their principle source of income.

Sustainability in Concept and in Practice

Sustainability is a polarizing word in today's society. It conjures attitudes of extremist environmental preservation at the expense of jobs, quality of life, and freedom. However, the concept of sustainability is much more conservative than extreme. The basic concept is that a society should not consume more than it produces. Ecological sustainability is intimately connected to long-term economic viability through the extraction, exploitation, and management of natural resources. A sustainable economy has four elements[9]:

1. *An economy where the rates of use of renewable resources do not exceed regeneration rates;*

2. *Rates of use of nonrenewable resources do not exceed rates of development of renewable substitutes;*

3. *Rates of pollution emission do not exceed assimilative capacities of the environment; and*

4. *Net ecological services do not decline over time.*

Renewable resources are those things we extract from nature that regenerate over time, such as food, fiber, and forest products. Nonrenewable resources are those things we extract from nature over time that do not regenerate, such as fossil fuels and metal ores. Assimilative capacities of the environment are a form of ecological service, and can be thought of as the ability of the natural environment to treat waste products. This process is part of the recycling of nutrients and organic carbon that result in conversion of pollutants into environmental resources. Ecological services are the things we receive from the ecosystem but do not necessarily pay for, and include other services such as soil retention, pollination, flood amelioration, biodiversity, and recreation.

In practice sustainability in Arkansas is driven by regulatory criteria. Water resources are the most regulated of all the renewable resources in Arkansas. Water quality management is dictated primarily by the Federal Water Pollution Control Act, also called the Clean Water Act of 1972 (CWA) and its subsequent amendments.[10] The sustainable management of water resources within Arkansas will most immediately determine the viability of a sustainable economy. Energy, food, raw materials, manufactured goods and other commodities can be transported over great distances from their sources to the consumers. However, with a few exceptions notable by their extremity, water cannot be practically transported over great distances. It is consumed in too great a quantity, and has been perceived too long as an abundant resource. Water supply is a limiting factor for the economic carrying capacity of a region.

Water Management in Arkansas

Water is managed in Arkansas by the Arkansas Department of Environmental Quality (ADEQ) and the Arkansas Soil and Water Conservation Commission (ASWCC). These agencies share responsibility for water quality as delegated through the US Clean Water Act via USEPA. They are ultimately responsible for Element 3 of sustainability: pollution control. ADEQ is responsible for assessing the condition of the waters of the State and implementing the Clean Water Act's (CWA) National Pollutant Discharge Elimination System (NPDES) permit program for point sources (discrete dischargers). Those include industries, municipalities, and some confined animal feeding operations (CAFOs). ASWCC is responsible for implementing the nonpoint source (non-discrete sources) control program in Arkansas, including the CWA 319 nonpoint source demonstration program.

These agencies have implemented a watershed approach to water quality management based upon ecoregions within the state. Arkansas has six major ecoregions: the Ozark Highlands, Boston Mountains, Arkansas Valley, Ouachita Mountains, Gulf Coastal Plains, and Mississippi Alluvial Plains. Six major river basins traverse the state – the Red, Ouachita, Arkansas, White, St. Francis, and Mississippi River Basins. These basins do not necessarily coincide with ecoregions; the White River Basin, for example, traverses the Boston Mountain and Ozark Highlands Ecoregions. Arkansas state agencies manage almost 88,000 miles of rivers and streams within 38 water quality planning segments, and over 500,000 acres of lakes and reservoirs.[11]

Priority Watersheds

Nonpoint source pollution in Arkansas is managed at the watershed level. The ASWCC, as the designated lead agency for the nonpoint source pollution management program selects watersheds in Arkansas each five years to establish management priorities. Initially, the priority watersheds were selected by consensus vote of the Nonpoint Source Support Group, a multi-agency committee of resource management agencies. This process was modified in 1998 with the implementation of then Vice President Al Gore's Clean Water Action Plan[12]. As a part of this initiative, State's were requested to develop a Unified Watershed Assessment. A special task force was convened to conduct the Unified Assessment. This unified assessment classifies the 58 8-digit hydrologic unit code watersheds into one or more of four categories:

- Category 1: Watersheds in need of restoration: do not now meet or face imminent threat of not meeting clean water act and other natural resource goals. These watersheds are identified as priority watersheds. In 2000 ASWCC classified 17 watersheds as Category 1.

- Category 2: Watersheds meeting goals, including those needing action to sustain water quality. In 2000 ASWCC classified 31 watersheds as Category 2.

- Category 3: Watersheds with pristine/sensitive aquatic system conditions on lands administered by Federal, State, or Tribal Governments. In 2000 ASWCC classified 28 watersheds as Category 3.

- Category 4: Watersheds with insufficient data to make an assessment. In 2000 ASWCC classified 10 watersheds as Category 4.

A subset of the category I watersheds plus the Buffalo National River were selected by the Nonpoint Source Support Group as top priorities for nonpoint source implementation projects. The priorities are also modified as new Total Maximum Daily Loads (TMDLs) are developed which identify nonpoint sources as the dominant cause of water quality impairment. The 2002 Nonpoint Source Pollution Management Report identified the top 10 priority watersheds in Arkansas as the Illinois River, Upper White River, Buffalo River, Strawberry River, Big Piney Creek, Cadron Creek, Poteau River, Lower Little River, Smackover Creek, and Bayou Bartholomew.[13]

Nutrient-Sensitive Watersheds

Arkansas has been engaged with surrounding states in an often contentious debate over the appropriate management of nutrients in rivers and streams. The presumed source of many of these nutrients is the land application of poultry litter from poultry production facilities in Arkansas. As a result of this discourse, Arkansas initiated a watershed nutrient management strategy for trans-state watersheds with Oklahoma and Missouri that have been designated nutrient surplus areas. These watersheds include the Upper White River, Little Sugar Creek, Honey Creek, Spavinaw Creek, Illinois River, Upper Arkansas River, Poteau River, and Mountain Fork.

In 2003 the Arkansas Legislature enacted Acts 1059, 1060, and 1061 requiring that all poultry producers be certified for application of nutrients to crops and fields, that these certifications be provided by nutrient management plans prepared by certified professionals, that all poultry feeding operations be registered with the State, and that nutrient management and poultry litter management plans be developed and implemented for those operating in nutrient surplus watersheds.[14] The increased cost to poultry producers for implementing these nutrient management strategies will be significant. In fact, poultry production may cease in many of these watersheds.

Water Quantity

In 1969 the Arkansas Legislature passed Act 217 making the ASWCC responsible for water planning at the state level. The Commission developed Arkansas' first Sate Water Plan in 1975 as a result of this edict. In 1985, the Arkansas Legislature passed Act 1051 directing the ASWCC to update the plan. This act also required all users of groundwater with flows greater than 50,000 gallons per day to register their withdrawal. Act 154, passed by the Arkansas Legislature in 1991, required ASWCC to establish a regulatory program to manage water quantity explicitly. However, since water rights in Arkansas have historically been governed by Riparian Water Rights rules, ASWCC only regulates groundwater withdrawal in designated critical groundwater areas. Currently no limits to groundwater withdrawal are applied unless affordable alternatives exist.

This approach to water quantity management is in transition, as Arkansas struggles with emerging conflicts over water quantity. The most dramatic example of this emerging conflict is the Grand Prairie region of Central Arkansas.[15] This area produces a good portion of Arkansas' rice harvest, an annual estimated value of $48 million.[16] This area was designated a Critical Groundwater Area in 1998. The water resources in this region are provided by an alluvial aquifer and a geologic aquifer, the Sparta/Memphis formation. [17] The groundwater from these aquifers is used for rice production and for municipal water supply. However, during the 1997-2002 monitoring period, the five-county area that utilized the Sparta/ Memphis Aquifer reported an average decline in water levels of over 9 feet. In the Sparta aquifer,

some wells showed declines as high as 21 feet. Maintaining this aquifer at sustainable levels will require reduction of pumping rate as much as 76 percent in some counties, which would all but eliminate the rice production economy of the region unless a replacement source of water can be found.

As a result, the US Army Corps of Engineers has developed a demonstration project to pump surplus surface water from the White River to replace the Sparta/Memphis supplies. In 2001, the project provided 60 reservoirs, 81 tailwater pits, and 60 miles of underground pipelines on-farm. In total, over $22 million in Federal moneys have been committed to the project to date, with much more on the way. However, the project faces significant opposition by organizations such as the Arkansas Wildlife Federation, who suggest that the project will result in diminished critical flows in the White River and consequently damage the significant recreational fishing economy of the region. Thus the struggle for ecological services is engaged in economic terms.

Making Shift with Things As They Are

The objective of this article was to explore sustainable management of water resources in Arkansas, and to illustrate the interconnectedness of sustainability with economics. A central premise of sustainability is that costs of ecological services must be borne by those who benefit economically from them. Put another way, the costs of products, goods, and services should include the costs of the ecological services upon which they depend. To do otherwise is to invite unintended consequences, because the desired outcome is decoupled from the economic processes that drive it.

The poultry producers in Northwest Arkansas are a good example of this phenomena. While the immediate effect of a shift in land use from poultry production due to the new regulations in Arkansas could be reduced nutrients in the streams, the long-term effects could be less desirable. It is likely that many poultry producing properties in the northwestern watersheds, for example, will shift to urban residential land use when producers can no longer operate profitably. Thus, the potential exists that while phosphorus may indeed decrease from agricultural nonpoint sources, point and nonpoint source loadings from residential areas may replace them. Citizens living downstream expect certain ecological services from upstream property owners, such as water resources and water treatment. Obviously, there must be serious consideration to the economic viability of those upstream property owners if those ecological services are to persist.

This level of interconnectedness and complexity requires a more sophisticated understanding of how policy and practice interact. The way people see the world, their mental models, are often too simplistic to allow for this complexity. Changing the way people see the world is among the most difficult of processes – it generally requires a great deal of time and trust. What is generally understood, though, is that the current approach to natural resource management, responding on a crisis-by-crisis basis, is unsustainable.

Finally, this discussion also illustrates the complexity of scale when considering sustainability. Water resources must be managed as the watershed and basin scale at a minimum, but larger ecoregional scales are necessary for effective sustainable management. In many cases, States are not adequately large or inclusive geographically to manage water resources in a sustainable manner. Multi-state collaborations are necessary to achieve this level of effectiveness. Developing these collaborations will require a great deal of trust among participants.

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oklahoma

Thoughts of an Oklahoma Environmentalist, Oilman & Teacher

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The Concept du Jour?
"Sustainable development" has burst forth this decade as the environmental concept du jour. Allegedly a term of seriousness and urgency, it is in reality an unhelpful generality. It adds little to the debate on the direction we should be moving in the area of environment and natural resource management. The Sustainability Movement began with the Earth Summit in Rio in 1992 (The UN Conference on Environment and Development) and reflects an obsession with the immanent insufficiency of resources and the misallocation of wealth between rich and poor nations. This fits well with the doomsayers on petroleum, gas, water, cropland, population, and the critics of globalization, but is really not helpful in energy and environmental planning or policy. The blunt fact is that it is the harnessing of abundance and allocation of wealth that is important for solution of current problems, particularly in Third World countries, not the dreary zero-sum game of perceived resource depletion. Optimism and confidence are better guideposts than their opposites. The ethos of "sustainability" is one of caution and limits. The pet technologies of the "sustainability" forces are wind, solar, ethanol and hydrogen. Despite their appeal, none are for the foreseeable future serious solutions to energy and environmental problems.

"If wishes were horses, All beggars would ride"

The Problem
There are real problems in reconciling modernity and continued industrialization with human nature and human health. The conflict began at least as far back as the Industrial Revolution in the 1800s. In 1890 New York City had 1.5 million people and half as many number of horses. The air was filled with smoke from coal and wood-burning houses and factories, outhouses and perhaps 100 tons of horse manure—daily. With the advent of the internal combustion engine, other problems developed. After 150 years of "modernity," stock is being taken regarding the future of mankind—as it should be. For the first time, science has given us the means to threaten our own existence. The concept of "sustainable growth" creates a misleading framework for the rational discussion of the paths we are to follow in solving some of the most serious threats the world has ever faced. The critical issues of human health and safety issues today and for decades in the future are not depletion issues.[1] They are hard choices nevertheless:

1) Will substantial adverse climate change occur, and how do we prevent it without destroying the world's economy?

2) Can air and water quality be improved around the world, particularly in the poorer countries?

3) Will genetically modified food or insects break loose from their carefully planned path?

4) Will modernity and population growth result in a dangerous decline in the world's species with an adverse impact on man?

5) Will a virus or microbe develop which man will be unable to prevent or control—a massive Ebola event? Can AIDS be eradicated before it reaches pandemic proportions?

6) Will a terrorist succeed in precipitating a catastrophic event from which the industrialized world could not recover?

7) Will a nuclear exchange occur?

8) How can 1 trillion barrels of tar sands and heavy oil be harnessed for another century of hydrocarbon sufficiency? Can gas hydrates be developed for another century of gas sufficiency?

9) Can LNG be safely relied upon to provide gas to the world?

10) Can we keep up the level of investment so that petroleum reserves are brought on line when needed?

The Carter Years

Thirty years ago I was in the Carter administration,[2] dedicated to the "commercialization" of alternate energy [3]—oil shale, tar sands, ethanol, hydrogen, wind, tidal power, solar, coal liquids, low-head hydro, biomass and nuclear fusion. We found that few of these sources would replace coal and conventional petroleum without massive subsidies. Tar sands were being pursued commercially in Canada and Venezuela and didn't need any help. Low-head hydro was feasible if you wanted to dam up America's streams. The rest were a great disappointment and continue to be. In some cases such as ethanol and hydrogen, they used more petroleum indirectly than they saved. In others—tidal, solar and wind—the technology was just not available and the environmental impacts greater than imagined.

Despite billions of dollars spent, the list of failed projects was astounding. President Carter eventually took the solar panels off the White House. We found that the tidal project for the Bay of Fundy was an environmental disaster, wouldn't generate much electricity and was not feasible from an engineering standpoint.

Oil shale left us with mountains of fly ash, which would in its wet-down state (the water demands were substantial) fill hundreds of beautiful western valleys. The oil shale cost stayed persistently above that of oil even as oil prices escalated. "In situ" oil shale (where the shale is set on fire beneath the earth's surface and the heat used to cause the oil to flow into underground sumps) was another expensive failure. The wind turbines of the time were mostly failures from a both a technical and economic standpoint. Old rotor blades can be found behind barns all around the country. Hydrogen was then and still is "the fuel of the future." And why make hydrogen from natural gas when gas itself can be used for the same purposes? Biomass is shorthand for burning wood, straw or other materials to generate electricity. It is generally of inferior heating capacity but still presents air quality problems similar to coal. Wood-burning stoves were all the rage in the '70s, but now many towns forbid the burning of wood in stoves and fireplaces due to the impact on clean air.

Ethanol—alcohol from grains— consumes more energy than it provides, in addition to taking arable land out of food production. Billions were spent starting in the''70s on solar power. (Congress insisted in 1978 that DOE ask for $1 billion in its budget for solar power research even though the Department had no idea how to spend that much.) DOE-sponsored solar power car races have been a tradition for the last 30 years with flimsy, kite-like vehicles forced to leave the road if the wind speeds ever got high. [4]

Alternate and Renewables -2004

Once again, with oil prices rising, the excitement over these "clean" and""sustainable" forms of energy is intense. But hydrogen is still 10-20 years in our future—about the same as it was when I testified on the matter before Congress in 1979. Wind turbines are much larger and more efficient, but the source is of limited benefits as will be discussed below.

The environmentalist and sustainability movements have selected fossil energy generally and the oil business in particular as the villain of the piece. No solution to problems that involve fossil fuels is acceptable. It is either too dirty or not—"sustainable." Sustainability and pollution

are very separate issues. With all oil, coal, tar sands, and natural gas, including LNG and stranded gas,[5] we have sufficient energy for the entire century. Nuclear energy extends this period further. Most of these sources (coal, tar sands, oil) present separate environmental problems, but ones that can be mediated. Gas is largely problem-free if the gas is not allowed to escape unused into the atmosphere.

Since the early '70s renewables have been the politically correct solution both to the problem of "sustainability" and to the environmental problems. Now, three decades and billions of dollars of subsidies later, what is the usage? Solar and wind combined equal less than .2 of 1% of U.S. energy production.[6] (This is .2% of electric power and doesn't refer to all energy. This is 1/46th of the energy provided by the largely moribund nuclear industry.) [7]

The Poster Child of Renewables - Wind Power
Let's look at the facts. PSO just announced that it seeks to manufacture and distribute wind power in the amount of 107 mw [8]. A suitably attractive photo of the turbines at sundown is provided. Power for 31,000 homes was predicted. Wow. "This is just the kind of thing we need more of" is the response of most Americans. Oklahomans ought to take a little longer look at this energy source.[9]

1. **Cost and Price:** This 20-year PSO contract is conditioned on an extension of the 1.8 cents per kilowatt tax credit for generated wind power. (This 1.8 is the approximate total cost of conventionally coal-generated power.) A tax credit is like cash—from the taxpayers of the nation—to the generating company. The power company wants to be a good citizen and support renewables, but even the tax credit is not enough to stimulate this altruism; they get to pass the higher generation cost along to the consumers. The consumers pay twice—first the tax credit, which is a taxpayer burden, and second, the higher cost which is passed on to them. Texas requires a 3-cent wind power premium that is paid by the customer in addition to the 1.8-cent tax credit, putting wind at about a nickel per kwh above conventional power.

2. **Quantity and Reliability:** Power from this PSO project would add only .0046 to Oklahoma's power capability (46/1000). To generate just 10% of Oklahoma's electric power needs, we would have to site and build 1,600 of the largest turbines, requiring 64,000 acres (100 square miles).[10] It would take about 4,000 turbines to supply the Tulsa metropolitan area's 3 gigawatts of electric power. If the amount of wind power in the U.S. were quintupled, it would still contribute only about 1% of the U.S. power generated. A combined cycle gas turbine power plant similar to several built in Oklahoma recently can produce 1,000 megawatts from about 15 acres. Another issue is reliability. Wind is notoriously fickle.[11] When the wind does not blow consistently at a speed needed to make the turbine operative (14 mph), no power is generated. When the wind is blowing too hard (60 mph), the turbine has to shut down. Since the power grid cannot rely on the wind power, fossil fuel spinning reserve power has to be maintained in the full amount of the wind power.

3. **Birds:** The impact on birds can be devastating. This is a great embarrassment for wind advocates and they attempt to minimize the impact. The wind towers in the Altamont Pass in California have on average killed 200-300 red tail hawks and 40-60 golden eagles each year.[12] According to the California Energy Commission, 7,000 migrating birds are killed each year by wind turbines in southern California.[13] In the UK and the Netherlands, many sites have been rejected because of proximity to wildlife refuges. The problem is primarily nighttime contact with the 1.5-ton, 747-sized blades, the tips of which are traveling at 180 mph.

4. **Noise:** Although engineering has sought to cut down on the noise, it still remains a serious problem in some locations. In the UK,

environmental officers have taken action "against the noise nuisance."[14] "For existing wind farms we are satisfied that there are cases of individuals being subject to near-continuous noise during the operation of the turbines . . . which are clearly disturbing and may have some psychological effects."[15] One farmer who lived 350 meters from one turbine and 750 from others complained of "sickening sound waves" and "disruption" of sleep even with the windows closed. From 1,000 meters the sound was so great according to one complaining group that "those of us who are unfortunate enough to be closest are experiencing a barrage of noise pollution, actually making some of those worst affected physically ill."[16] (There is no evidence to date of noise complaints in Oklahoma.)

5. **Height:** Three hundred feet is the equivalent of a 30-story building. Some of the largest turbines in Germany are 500 feet high, equal to a 50-story building. Historian David McCullough is protesting the installation of turbines in and around Cape Cod. These turbines would be 410 feet tall. "I'm not against wind turbines. I'm against 130 of them over 400 feet tall right smack in the middle of one of the most beautiful places in America." [17] (Actually there are 612 planned for Cape Cod and Narragansett Bay.) [18] The "Cape Wind Project" alone involves 130 turbines that will be spaced 880 yards apart over a 24-square-mile area four miles offshore. [19]

6. **Aesthetics:** Most photography of wind turbines deserves an artistic prize. Never has one seen so many sunsets and lush, rolling grass fields with well-groomed cattle. The pristine white sculpted structures in the background look like some kind of avant-garde artwork. The reality is that these structures are large industrial machines that can be seen for 20 miles or more. They also often claim the most conspicuous and picturesque high ground. The British and Dutch fear that their cliffs and coastline will be covered with these large towers. In the U.S. many sites are less picturesque than Cape Cod. Few would argue that the plains of Woodward County resemble the blue seas off Hyannis Port. Still, how many 30- to 50-story towers do you want on your neighbor's land?

7. **TV Reception:** Each turbine leaves a "shadow" of as much as 10 km radius and will also interfere with microwave transmissions. Some in England have complained of complete loss of their TV reception.

8. **Safety:** The 1.5-ton blades travel at 180 mph at the extremity and on occasion shatter or break off. When they do, the parts or pieces fly almost a quarter mile and hit with a 170-mph impact. In Palm Springs the traffic safety authorities insisted the turbines be at least a half-mile from the highway. In cold climes ice chunks on the blades can break off and are like shrapnel to nearby persons. Suspected metal fatigue has caused the shutdown of several UK turbines. The British Horse Society insists that riding trails be 1,000 to 1,200 feet from the towers due to danger to horse and rider.[20] Most turbines have a maximum wind speed beyond which operations are not safe. At this point power generation ceases.

9. **Jobs:** The largest wind "farm" in Germany has three full-time employees; many have just one.

10. **Other Environmental Impacts:** To support a tower the height of two Statues of Liberty,[21] a huge, swimming pool-sized cement foundation is required. Not only must the concrete be trucked in, but the fill needs to be trucked out. There have been complaints that the large foundations have interfered with groundwater flows. The large trucks require heavy all-weather roads.

Renewables - A "Feel Good" Distraction

Wind power is the most oversold energy source since the solar craze of the'70s. This is not to say that wind will not make any contribution to the energy needs, but just that it really isn't anything

serious people in the energy business get worked up over.'"Renewable energy . . . is a showy way for politicians to prove that they are doing something."[22] As the British opponents of wind power put it: "Tinkering at the edges of the problem by supporting a technology like wind, which is unpredictable, intermittent and dependent on machines whose output is derisory, is a dangerous distraction and a piece of "green" window dressing designed to allow the government to avoid the problem."[23] Major oil companies have cynically joined the parade with lavish ads regarding wind power to demonstrate their sensitivity to environmental problems. One might be forgiven for thinking that BP with its new green and yellow logo was primarily in the wind and solar business. The public seems to have signed on to the push for renewable power rather than face the real issues.

Oklahoma Today

The environmental problems specific to Oklahoma and America are real and they should be tackled directly:

1) Abandoned well sites or salt-damaged lands must continue to be cleaned up by the OERB, a unique Oklahoma program. This costs money which the oil industry has taxed itself to pay.

2) Water quality, particularly in northeast Oklahoma, must be improved and high standards for toxics and nutrients maintained. (The City of Tulsa's litigation against parties in Arkansas contains a reasonable process which must be pursued.)

3) Tar Creek must be cleaned up. Not only is the lead a potential threat (yet to be quantified) but also the mineral-laden water of Tar Creek runs directly into Grand Lake—a huge Oklahoma playground asset.

4) Air quality must be improved. More scrubbers for refinery and power plant emissions are needed. There should be no exceptions to New Source Review Standards. We should consider tougher regulations on trash-to-energy plants—their scrubber systems are often nonfunctioning. The energy they produce is negligible, and the toxins derived from burning all manner of refuse are dangerous.

5) The waters of Oklahoma should all be made fishable and swimmable. This means eliminating discharges of partially treated sewage from municipal systems, preventing septic and other types of wastes, and establishing total daily maximum loads (tmdls) for wastes. The nonpoint source pollution (urban runoff, storm sewers, etc.) needs to be treated or minimized.

6) A serious effort should be made to conserve energy.[24] Such saved energy would dwarf all the proposed green power alternatives. (One thing we did accomplish during the Carter years was to increase energy conservation.)

7) If we really want to do something about global warming, we need to immediately take a fresh look at nuclear power.[25]

None of the above problems involve the issue of sustainability or resource depletion. Our resources are abundant and our energy demands to maintain our standard of living are immense. Solving the above problems involves making hard rational political decisions and providing the funds needed.

End Notes

1 *There is a 35-year supply of conventional oil based on current reserves. There is perhaps twice as much supply if the 1 trillion or more barrels of heavy oil and tar sands are included. There is another 100 years if all the oil shale is used. Coal-to-liquids technology could also extend available motor fuels for decades. LNG will enable the world to utilize the huge quantities of unused or stranded gas. Gas hydrates could extend the available hydrocarbons into the 23rd century. The price of oil and gas will go up, but the supply is not a problem for us, our children or our children's children. This is not to say that we and our grandchildren are not entering one of the more dangerous periods in world history.*

2 *1977-81 Deputy Asst. Secretary*

3 *"Alternate" energy is a more inclusive term referring to new energy sources which may be depleting resources, e.g., oil shale.*

4 *Solar is lumped in with wind in the .2% contribution number. Energy Information Administration monthly Energy Review, June 2004.*

5 *A huge quantity of gas is found around the world where it cannot be used, hence is "stranded." LNG ports and tankers are being developed so that this gas in a cryogenic state can be delivered to the U.S. and other major gas users.*

6 *Solar and wind energy produced in 2003 equaled .2 of 1% of all energy produced in the U.S. U.S. DOE hydro equaled 3.9%. If hydropower from U.S. dams is included in the renewable category, the percentage is about 4-5%.*

7 *Energy Information Administration, Monthly Energy Review, June 28, 2004.*

8 *Tulsa World, June 29,2004.*

9 *I have used an output level of 50% of theoretical capacity. The UK data indicates that most turbines only produce about 25% of the theoretical output.*

10 *The PSO project with 3,800 acres and 71 turbines uses 53 acres per turbine. I have used 40 acres.*

11 *See "The Rhyme of the Ancient Mariner" by Samuel Coleridge.*

12 *Country Guardian, "The Case Against Wind Farms," May 2000.*

13 *In over 15 years of regular attendance of drilling and production operations in connection with my operating company I did not ever observe a bird death due to oil or salt water pits even before netting was required. It is clear, however, that some did occur, particularly before the netting requirement.*

14 *Op cit.*

15 *Op cit.*

16 *Country Guardian, op. cit.*

17 *Associated Press, August 12, 2003: "They Call the Wind Farm Pariah," Jennifer Peter.*

18 *Ibid. It is a curious environmental priority that would locate 612 towers 410 feet high off one of the most beautiful and densely populated coasts in the world to generate no more power than comes from one gas turbine generator (i.e., 300 mw) and yet not allow a single drilling rig in an unpopulated arctic wilderness that might lead to 10 billion barrels of oil.*

19 *Save Our Sound, The Worst Location, http://www.saveoursound.org/bestworst.html. Jan. 2004. This calculates to 123 acres per turbine.*

20 *Country Guardian, op. cit.*

21 *From heel to torch, 151 feet; from bottom of foundation to tip of torch, 305 feet. See World Almanac 2003, p 558.*

22 *James Lovelock, prominent scientist quoted in Financial Times,*
June 24, 2004, p. 9.

23 *Country Guardian, op. cit.*

24 *China, as is well known, is pressed for energy to build its economy. Its solutions are of note. The world's greatest hydroelectric project has been built despite concern over the huge area inundated. China is building two of the world's largest Sasol coal-to-liquid plants ($3 bn each) and is building numerous nuclear generating and LNG facilities. It has also undertaken a massive energy conservation program and is seeking new oil reserves at home and worldwide.*

25 *Nuclear power now generates 11% of U.S. power. See U.S. Energy Information Administration, June 2004 Monthly Review.*

Thoughts of an Oklahoma Scientist and Educator

Charles J. Mankin, PhD, Director, Oklahoma Geological Survey, and Sarkeys Energy Center

Sustainability is a concept that is generating considerable discussion, particularly in context with our growing dependency on non–renewable natural resources. Some would argue that the two are entirely incompatible, given the fact that some natural resources are indeed finite. The position taken by a growing number of people is that we should reduce our dependency on non–renewable natural resources to preserve some for future generations. The increased use of wind and solar energy for electric–power generation are examples of those concerns.

The use of non–renewable natural resources with respect to meeting our energy needs is a good example of this perspective. In the early history of our country the primary sources of energy came from "horse–power," "man–power," wind, water, and wood. All of these energy sources are considered to be renewable.

When coal was discovered, it replaced some use of these resources, especially in factories, trains, ships, and commercial and home heating. The primary advantage that coal had over other energy resources in use at that time was its energy density. One ton of coal has the same energy value as three tons of wood. Thus, trains, ships, and other energy systems that relied upon steam as their energy source could operate more efficiently using coal in place of wood. Factories, trains, ships, and even residential and commercial heating were provided by coal either directly or through the production of steam.

Oil was discovered in Titusville, Pennsylvania in 1859. In a relatively short period of time, this hydrocarbon replaced coal in a variety of usages in the commercial and private sectors. This did not occur because we were running out of coal; rather, crude oil and products such as gasoline, kerosene, and bunker oil were commodities that could be used more efficiently than coal. Coal continues to be used in some static sources, such as electric–power generation and some industrial processes because of its cost advantage over these new rivals.

While natural gas was discovered essentially at the same time as the discovery of oil, the widespread use of this commodity was substantially delayed. Billions of cubic feet of natural gas that were produced in association with crude oil were flared because there was a limited market for the commodity and pipelines did not exist to move that product to distant markets. A natural–gas market began to be developed prior to World War II and began to flourish with the development of transcontinental pipelines.

However, the wellhead price of natural gas did not reach $1.00 per mcf in Oklahoma until 1979. Compare that with today's prices in the $6.00 range. While the prices were low in part because of regulatory structure, it was also limited by demand. Through a broad range of research and technology developments, natural gas became important as a chemical feedstock in the production of a large number of products ranging from plastics, fertilizer, and chemicals. In addition, it became an important source of heat for industrial processes, commercial and home heating, and electric–power generation.

So, what does this have to do with sustainability? First, it is important to note that the change in use of these energy commodities had nothing to do with their availability. We have never "run out" of any of these commodities and we never will.

Price, ease, and consequence of use were the primary drivers in the penetration of these commodities in the market place.

Diesel replaced coal in trains because diesel could be injected into the firebox mechanically and had no residue to be removed. Thus, the process was much less labor intensive and substantially less polluting. Likewise, fuel oil and natural gas replaced coal in the residential and commercial markets for the same reasons. It should be noted that the only shortages in coal supply in the US came from labor strikes protesting wages and working conditions.

However, to meet the principle of sustainability, we will need to have adequate supplies of these commodities for many generations into the future. Given the current tight supply of transportation fuels, what can be said about the future of these fuels?

The current tight supply of transportation fuels is in part the result of production controls by major producing countries to maintain these prices, and the inability of domestic producers to gain access to existing resources that either have restricted access or no access at all. So, the current tight supply of transportation fuel is not because we are approaching world depletion of these resources. The global resource base is adequate to meet world needs for many centuries into the future.

It should be noted that early in the history of petroleum development, many large reservoirs were developed and produced very inefficiently. The large oil fields discovered in the early history of Oklahoma are prime examples. These fields were discovered and developed when our understanding of petroleum reservoirs was very limited. To be a producing well, the oil had to flow to the surface because pumps had not been developed that would extract crude oil from depths of several thousand feet. If the well produced natural gas, it was commonly flared because there was a very limited market for that commodity, and through experience, it was found that in many instances those wells would begin to produce some crude oil. What was not recognized was that the natural gas was the reservoir energy that caused the crude oil to flow to the surface.

By flaring the natural gas contained in the reservoir, the amount of crude oil that could have been produced was significantly reduced. Some estimates of this early production indicate that as little as 10 to 15 percent of the oil in those reservoirs was recovered. The amount of crude oil remaining in those and other reservoirs in Oklahoma has been estimated by Dan Boyd, a petroleum geologist with the Oklahoma Geological Survey, to be between 44 and 82 billion barrels. Fields in other states that were developed during this early history should have similar remaining resources.

However, at some point in the future, the world supplies of crude oil will approach their economic limit and it will be necessary to develop other sources of transportation fuel. Fortunately, those resources are available and the technology to produce transportation fuels from those resources now exists.

The conversion of coal and natural gas to a transportation fuel is an established technology. In fact, the basic process was developed many years ago. The first documented use of this process was by Germany during World War II when the Allies bombed the Romanian oil fields and greatly reduced that source of transportation fuel. Coal was the energy source that was used to produce that fuel. Some years later, this process was used by South Africa when they were denied access to transportation fuel because of Apartheid.

While it is a proven technology, it is more expensive than refining crude oil.

Continuing work has improved the process, and several variations of that technology now exist. Most of these technologies have been developed to convert natural gas to transportation fuel, although coal could be used as well.

One of the most important products from this technology is the conversion of natural gas to diesel. Diesel is our most important transportation fuel. While most vehicles in the U.S. run on gasoline, diesel-consuming vehicles are critical to our continuing well being. Trains and 18-wheelers run on diesel. In particular, the 18-wheelers deliver the food we eat to the grocery stores and the gasoline we use to the service stations. Without an adequate supply of diesel, we won't have food to eat nor fuel to get to where we need to go. While we are almost 60 percent dependent on imports for all transportation fuels, we are almost 80 percent dependent on imports of diesel. Most of those imports come from Venezuela, a country that is in political turmoil at present.

The advantage of using diesel produced from natural gas is that it exceeds the standards for gasoline emission. This fuel has no sulfur, no aromatics, and a very narrow range of short-chain hydrocarbons. This fuel achieves almost full combustion from a "cold" start, resulting in limited particulate emission. By comparison, diesel refined from crude oil contains some sulfur, some aromatics, and a much larger range in carbon structures. This results in non-combustion of some of the longer chain hydrocarbons until the engine reaches its normal operating temperature. Even then, the emissions are much larger than fuel produced from natural gas.

Another significant advantage of using diesel produced from natural gas is the very large global reserve base of this commodity, estimated to be 5,304 trillion cubic feet. Approximately one-half of that natural gas is considered "stranded," meaning that there is no local market for its use. An effective use of stranded gas is to convert it to transportation fuel because the value of that gas is very low, thus keeping the product in line with other sources of transportation fuel.

While the world reserves of natural gas and coal are very large and the undiscovered resource base is larger still, such resources are finite. So, at some time in the distant future, these sources of energy will be on decline. However, if history is any key to the future, we will have developed new sources of energy long before that problem arises. Given the experience with the conversion of natural gas to a transportation fuel, the transition to a hydrogen economy is very probable. Should that occur, we finally will have achieved an energy source without end.

The environmental consequences of using hydrogen as a principal energy source are most attractive because the product of that combustion is water. However, the challenge of developing an economic process that will produce large volumes of hydrogen is indeed daunting. At present, fuel cells are considered to be one approach to produce hydrogen as an energy supply. Unfortunately, natural gas is the primary feedstock that is being considered in this process. So, fuel cells may result in reducing pollution, but will not address the use of a non-renewable energy source.

The breakthrough that must occur if hydrogen is to be used as our major energy supply in the future is an energy-efficient extraction process of hydrogen from water. While hydrogen can be recovered through the process of electrolysis, that requires the consumption of more energy than is contained in the recovered hydrogen.

An additional issue must be included in considering the use of hydrogen in place of natural gas. At present, natural gas is transported by a very large network of pipelines throughout the country. While those pipelines can safely carry natural gas though this system, they would have to be replaced to move hydrogen in the same manner. Because of its size and activity, hydrogen can penetrate the pipe causing embrittlement that could lead to pipe failure.

Fortunately, the large supply of non-renewable energy resources that are present on planet earth will be able to sustain our needs until all of the issues relating to the use of hydrogen can be addressed.

The two examples cited above are not meant to be the only issues in the development of a hydrogen economy nor necessarily the most important. Rather, they indicate the need for a major scientific effort and a recognition of the need for a national infrastructure in developing a hydrogen economy.

In conclusion, it should be noted that the goal of sustainability is not based upon restricting our use of resources. Rather, it is based upon the application of science and technology to convert a broad range of those resources to commodities needed to sustain our way of life.

Tar Creek: Oklahoma's Poster Child for "Imbalance"

Steve Thompson, Director, Oklahoma Department of Environmental Quality

Tar Creek

As the band serenaded the fiftieth such gathering June 12, 2004 in Reunion Park, miners reminisced about the glory days of Picher, Oklahoma. This was the heart of the Picher field, the richest lead and zinc ore deposits in North America, and the most productive of the area called the Tri-state Mining District. This region stretches underground from Jasper County, Missouri and Cherokee County, Kansas into Ottawa County, Oklahoma. Picher is "the town that jack (zinc ores) built".

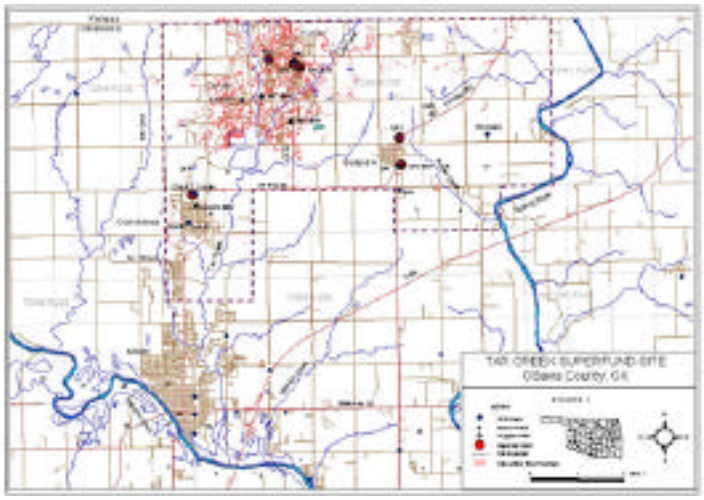
History

A 1907 Geological Survey map shows Ottawa County with Miami and Quapaw as towns of prominence, but Commerce (originally Hattenville), Picher and Cardin did not exist. Already some mining thrived in Lincolnville and Peoria closer to the Spring River. Vast stretches of native prairie, partitioned by meandering steams became the homeland of the Quapaw tribe as they were removed to Oklahoma in the 1870s. The land was apportioned by the tribe into individual allotments of 40, 60 or 120 acres between the State line and the Neosho River. They and their neighbors, the Wyandotte, Peoria, Eastern Shawnee, Seneca-Cayuga, Modoc, Miami and Cherokee hunted and fished, gathered wild plants and mussels from this fertile land to which many of these tribes had not traveled willingly.

The hint of mineral deposits brought contracts for the land that many Indians sold unaware of the riches below. The Bureau of Indian Affairs (BIA) established a Miami office and held competency hearings to protect the individual allottee's interests. Then the BIA managed the leases, the US Geological Survey sent geologists to supervise the recovery of the ores and payments of royalties to the owners. The leasing contracts required a mill on each 40-acre tract, with the tailings (or chat) returned to the owners' land for future use as crushed rock. As the mining advanced and better recovery processes evolved, many of these piles were co-mingled through reprocessing at large Central Mills. The current Cobell lawsuit filed by multiple tribes seeks to recover monetary damages because of alleged misappropriation of tribal resources in this, as well as other mineral rich areas of the US. By 1927, Picher boasted a population approaching 15,000, thousands of boreholes showed clearly on aerial photographs and piles of waste rock, mine tailings, rail spurs and roads pockmarked forty-seven square miles of land that was part of the Quapaw tribe allotments.

Many homes were built on Indian lands in the heart of these towns and leased annually to homeowners. To this day, they have no rights to the land, and no permanent rights to the structures on them, even though they bought the home itself from a previous owner.

Mickey Mantle (R) is shown here with his late father Elvin C. (L) and Cliff Mapes, (C), a former Yankee who lives at Pryor, Oklahoma, at one of Commerce's lead and zinc mines. Mickey's father who died May 1952 was ground foreman at the time.



Picher. A water well drill rig that had become mired in a slough on the prairie just east of Tar Creek sank a hole to recoup some of the loss from being stuck in the mud. This led to the discovery of the Picher Field with quick development of the Crawfish, Netta, Whitebird, and Bingham mines and by 1916, four large mills were in operation. Prior to 1921, mineral leases were obtained directly from the Indian allottees for small royalty rates. In 1921, the government assumed control of some of the lands held by Indian allottees and the Indian agents negotiated leases directly with the mining companies. The town of Picher sprang into being from uninhabited prairie to a mining town of 15,000 with mines that later became the world's largest source of zinc.

Douthat, Hockerville, Zincville and other mining towns remain only on old maps or signs. The hulking concrete pillars, mine collapses and millponds are reminders of economies built on the labor of the hard rock miners who still gather once a year in dwindling numbers to recall their exploits underground, their pride still strong, their stories recalled fondly, even when tragedy skirted around them. Extraction of lead and zinc ore from the Picher field supported US troops in two world wars and fed the economic recovery after World War II. The dark side of these efforts included silicosis and tuberculosis, accidents, fatalities and the lingering problems Ottawa County faces today.

Mining Process

Lead and zinc were first discovered in Oklahoma near the surface in 1891 on the Peoria reservation. Lead and zinc were first discovered in Lincolnville in 1901. Small mills were built and concentrates were produced in 1904. Peak production occurred in 1909 from these mines 50 to 150 feet deep. Around 1907, zinc sulfide was found in the cuttings of the water well for the Town of Quapaw, located 2 miles NW of Lincolnville. Deeper more rich discoveries were made in 1907 at Hattenville four miles north of Miami at what is now Commerce, and at Picher in 1914, both on the Quapaw reservation. [1] In 1914, a rich strike was made on the Crawfish land leased by Eagle-Picher at a spot that is now located on the north side of

The Picher field development expanded at a rapid pace with zinc production increasing from 28,000 tons in 1915 to 502,000 tons in 1920. Production peaked in 1925 with 749,254 tons of zinc and 130,410 tons of lead. [2] The Hattenville (Commerce) development led to the formation of the largest mine operation in the Oklahoma - Kansas field. The depths of the mines there ranged from 90 to 385 feet below ground level.

Ore deposits occur in the water-filled Boone Formation from 100 to 300 feet below ground level. The ore minerals are galena (lead sulfide) and sphalerite (zinc sulfide). Mining operations consisted of drilling holes to locate the ore deposits then sinking vertical shafts when the ore body was defined (oftentimes five per 40 acre tract). The ore was mined by room and pillar methods. [3] At the surface, the raw ore was crushed in stages and the metals were easily separated by gravity separation or, later, flotation. Waste rock, development rock, chat, and tailings materials were dumped at the surface in waste piles. Many wastes were re-milled as more efficient separation techniques became available. Established practice during the early days of mining was to have individual mills for each property (leasehold) to avoid royalty complications. Government policy, on behalf of its

Quapaw Indian wards, was to require a separate mill for each 40-acre tract. [4] In 1926, there were 227 mills in the camp, a few with capacities of up to 720 tons per day. The first centralization was accomplished at the Bird Dog mill where a large mill was established to treat ore from a number of the company's own mines. Next, the Eagle-Picher Central Mill began construction in 1932 at 3,600 tons daily capacity. By 1938, it had been enlarged to 5,500 tons and in 1943 had a capacity of 15,000 tons per day [5]. The mill processed ore from many mines owned by different companies through trucking and by railroad cars

By 1943, the Central Mill had treated 21,290,472 tons of ore and produced 1,163,612 tons of zinc concentrates and 164,984 tons of lead concentrates. [6] Chat is the waste product (tailings) derived from milling operations (jigging) to recover lead and zinc and consists of material typically ranging in diameter from 5/8 inch to less than No. 200 sieve.

During the peak years of 1925 and 1926 there were between 184 and 193 companies operating in the area. [7] In 1918, it was estimated that 230 mills had been built or were being built in the Oklahoma part of the field. This is a rough estimate of the number of mining operations at the time. Some leases had minimum production requirements to keep the lease in force. Consequently there was a large turnover of mining companies. New leases were constantly being established with each new operator. As a result the mines changed names to the extent that the concept of what constitutes a 'mine' was rather artificial.

When the floatation method was incorporated into the milling process in the latter half of the 1920s, tailings piles previously produced by tabling and jigging were re-milled and became a major source of zinc production. Mostly zinc was recovered from the tailings mills but a little lead was also recovered - most of the recoverable lead had already been removed during the original milling.. Use of the floatation process in conjunction with tabling and jigging made possible the recovery of 80 - 85 percent of the metal contained in the crude ore, compared to the 58 - 70 percent recovery estimated for the older milling [8]. The recovery of zinc from milling of old tailings varied form 1.28 to 0.19 percent of the tonnage treated. Approximately 150 million tons of tailings or chat were produced over the lifespan of the mining. About 75 million tons remain scattered over the 5,000 plus acres of the site today.

Ores were also smelted in the Tri-state Mining area. Initially there may have been crude log smelters associated with each mine [9]. However, these were later consolidated, and by the late 1800s only three smelters remained in Jasper County. A smelter was also established at Galena in Cherokee County in about 1920, and it remained in operation until 1970.

The only known smelter in Ottawa County (Oklahoma had 17 known smelter sites, mainly because of the ore from the Picher field) was in operation on the eastern edge of the Picher mining field at Hockerville. It was built in 1918 by Ontario Smelting Company and sold to Eagle Picher in 1923. It was composed of a five hearth lead smelter and a battery scrap plant. The price of zinc fluctuated and the zinc industry suffered during the depression of the 1930s, with a production low of only 168,000 tons of zinc concentrates in 1932 [10]. During the late 1930s and 1940s lower grade 'sheet ground' deposits were mined and the lower grade ores were produced with increased mechanization in the mines and centralized milling. Production declined during the 1940s despite a government subsidy (Premium Price Plan continued until 1947) for base metals that ensured a profit to each marginal operator above his production costs. A new production low was reached in 1949 due to depletion of reserves. By mid-1958 most of the major mining operations were closed, although Eagle-Picher remained active through the late 1960s due to its integrated activities in the lead and zinc industry (smelting, refining, fabrication and marketing of final products) [11]. Pumping was discontinued in 1965 in many mines and the ground water table which had

been kept below the level of mining by widespread pumping at many stations was allowed to rise and partly fill some of the lower mine workings.

Total value of the lead and zinc obtained from Ottawa County is estimated to be about $983 million [12] or 1.4 billion from the Picher Field in both Ottawa County, Oklahoma and Cherokee County, Kansas (7,283,000 tons of zinc and 1,766,000 tons of lead) [13].

No regulatory authority required any kind of cleanup as the mines closed. In many cases, the mining companies wanted to plug mineshafts but were prevented by the Indian landowners who still hoped for more mining to become feasible in the future.

While the mines operated within the Boone formation, millions of gallons of water were pumped. When the mining stopped, the gougers were allowed to go into the mines and remove additional ore from the edges of the pillars that supported the roofs. In some cases the rooms were over 100 feet high. Sometimes entire pillars were removed. The gougers were supposed to get approval from the mining inspectors, but sometimes the mines were officially closed but gouging operations continued until the roof collapsed or until the mine filled with water.

In the late 1970s, orange water began seeping out of the ground in a pasture in Commerce. Investigations showed that the mine water, having oxidized the minerals in the remaining rock, had dissolved metals from the formations and seeped out of a borehole. The water was extremely high in iron and other metals as well as being acidic. Other seeps in Tar and Lytle Creeks as well as overflowing shafts created the reddish orange streams we know today. Even before this occurred, aquatic life in the Spring River and other major surface water bodies was high in metals with low pH.

In June of 1980, Governor Nigh of Oklahoma formed a Task Force, led by the Oklahoma Water Resources Board, to investigate and address the acid mine discharges. The primary threat identified was the potential for contamination of the Roubidoux aquifer, the primary drinking water supply in the area.

NPL Listing

In June of 1982, the Environmental Protection Agency (EPA) funded the Oklahoma State Department of Health (OSDH) to conduct a Remedial Investigation and Feasibility Study (RI/FS). The OSDH in turn funded the Oklahoma Water Resources Board to conduct the RI/FS. The RI/FS investigated migration of contaminated water from the Boone Aquifer to the Roubidoux Aquifer, surface water contamination, inventoried milling waste, and investigated leachate and fugitive dust from chat piles. The RI/FS was completed in December of 1983. Tar Creek was one of the first sites listed by EPA on the National Priorities List (NPL) as a Superfund site. At this time human health impacts had not been identified.

Operable Unit 1

Surface water and ground water

The EPA signed a Record of Decision (ROD) to state the remedy for Operable Unit 1 (Surface water and ground water - OU1) on June 6, 1984. To prevent further degradation of surface water, the ROD called for reduction or elimination of recharge to the Boone aquifer. Diking and diversion structures (i.e., berms) were constructed and plugs installed to stop the surface water of Tar Creek from entering the two collapsed mine shafts in Kansas that were identified as the main inflow points. In Oklahoma a mineshaft was plugged and a berm was constructed to divert Lytle Creek away from possible inflow points. To prevent further migration of acid mine water to the Roubidoux a total of 83 abandoned wells were plugged. Construction activities were concluded on December 22, 1986.

After Action Monitoring shows that the diversion was only partly successful. Surface water quality is improving but there are too many additional conduits between surface waster and groundwater. There are over 1,300 mineshafts, hundreds of thousands of boreholes and potential interplay between the Boone and the underlying Roubidoux aquifer. Tar Creek was declared incapable of achieving a beneficial use, and the area limped along loosing population as the infrastructures of the towns could not keep pace with the overall loss of income in the area.

The Ottawa Reclamation Authority was created as a Trust Authority to receive the land owned by the mining companies as they left the area. Many of the large chat piles were used for roads, fill and ballast for railroads. The rail spurs were abandoned. Mineshafts were either closed or simply served as dump sites. Large subsidence features appeared where the mine structures had been weakened by the removal of pillars. Other collapse features developed around mine shafts or boreholes that were improperly closed, allowing water to erode the supporting structures with sudden openings of the ground.

Complicating the community survival, half of the towns of Picher, Cardin and Quapaw are on town lots that belong to heirs of the original Indian allottees. These town lots were leased for $50-$100 per year with leases saying that the lots were leased as unimproved property. If the Indian landowner, or BIA as lease manager, terminated the lease, any improvements (including homes or businesses) became the property of the landowner. So, while people did buy and sell the housing structures, clear title was not available making loans for home improvements difficult. Even town lots on Ottawa Reclamation land leased for $8 and up per year. The result is many very poor families migrating to the area. Property taxes were not collected from unassessed lands, and the infrastructure continued to deteriorate. Recently rents were raised on Indian properties and many homes have been abandoned. Only about 250 homes in Picher and Cardin qualify for the Homestead Exemption.

New information on contamination associated with mining waste began surfacing in the early 1990s, prior to the first Five Year Review of OU1 in 1994. Investigations of the Cherokee County Superfund Site (Kansas, EPA Region 7) indicated that mining wastes in Kansas contain elevated concentrations of lead (as high as 13,000 ppm) and cadmium (as high as 540 ppm). In Ottawa County, the Indian Health Service informed EPA that 34% of the 192 Native American children tested had blood lead levels in excess of the 10 ug/dL standard. From August 1994 through July 1995, EPA sampled soils in High Access Areas (e.g., day care centers, school yards, and playgrounds) and residential properties to determine the nature and extent of contamination in residential areas of the site. The Residential Remedial Investigation (RI) Report was issued in January 1997.

A blood lead survey conducted in Picher in 1995 by the Oklahoma State Department of Health (OSDH) found a percentage of children with elevated blood lead levels similar to that predicted by the Baseline Human Health Risk Assessment (BHHRA). Later surveys conducted in August, 1996 and September, 1996 found that 38.3 percent (31 of 81) of the children tested in Picher, 62.5 percent (10 of 16) of the children tested in Cardin, and 13.4 percent (9 of 67) of the children tested in Quapaw had blood lead levels which exceeded 10 ºg/dL. Lead takes the place of calcium in young children. This can cause central nervous system impairments that are permanent. Symptoms include: irritability, nausea, difficulty concentrating, hearing impairments and shorter stature.

Remediation of Residential Properties-Operable Unit 2 (OU2).

EPA signed a second ROD on August 27, 1997 to address the soil contamination in residential areas. The remedial level set for lead in the residential soil cleanup at the Tar Creek Superfund Site is 500 mg/kg. [14] Non-residential and commercial levels have not been determined for the Tar Creek Superfund Site. Part of the current difficulty with this site stems from the disconnect between

residential yard remediation and addressing the impacts from the chat piles and tailings ponds that surround residences in Picher and Cardin.

This new ROD was for removal of soil above the remedial level up to 18 inches deep at residential properties, termed Operable Unit 2 (OU2) As of April 2004, approximately 2,0000 residential yards were remediated. Work is ongoing, and many people who initially denied access now are coming forward and asking for their yard to be done. There are a small group of dissatisfied homeowners who feel that EPA's contractors damaged their property during remediation. Some of these claims are in mediation but this clouds the issue of remedial success. The percentage of children with elevated blood lead levels is now under 11%. This is still above the state average but the Public Health outreach and education combined with the yard remediation has improved the situation. In addition, Grand Gateway Economic Development Authority and the Quapaw Tribe have lead abatement grants from Housing and Urban Development (HUD) to help with lead paint testing and abatement for low-income residents.

Schools in the area lost pupils because of the general population exodus. Picher Schools take in many transfer students, possibly because of small class sizes or their ability to hire special education teachers. Lead is implicated in a number of studies with difficulties in learning and concentrating. Very young children (below 7) are at special risk. Their neural pathways are still developing and exposure to lead can cause permanent damage. There are studies that also indicate blood pressure and possibly kidney problems following exposure to heavy metals. In this population, with high numbers of Native Americans and relatively high smoking rates, no epidemiological study has successfully tied the mining to these types of diseases. While mining was going on, Ottawa County had high incidence of both tuberculosis and silicosis. The Agency for Toxic Substances and Disease Registry (ATSDR) is evaluating the current status of children in the area related to lead poisoning and the Tribal Efforts Against Lead (TEAL) group also continues testing on a systematic basis.

In all these efforts millions of dollars of Federal and State money have been spent. The health status of children has improved, but the chat piles, millponds and sludge pits remain. EPA has negotiated an agreement between two of the extant mining companies and the Department of Interior to execute a Remedial Investigation and Feasibility Study of these features. The Scope of Work for this project still leaves many issues such as surface water and potentially contaminated groundwater unaddressed. Ten years after the residential RI, the cleaned up yards are sitting in the middle of the chat piles and the blowing dust. EPA sampled some of the yards and it does not appear they are being re-contaminated, but the mess still remains. No one Federal agency has the responsibility to clean up this site holistically. Within the past year, efforts by both the legislature and the Governor's office are producing very needed activity.

Present Day

Swirling controversy and hints of opportunity keep interest in this slice of Oklahoma high. Many factions or groups have the "solution" for Tar Creek. Residents complain that if this area were in Oklahoma City it would have been fixed by now. But Joplin, just over the state line is also undermined, with little alarm voiced by residents. To understand the controversy, the current communities need more exploration. Six towns, Picher, Cardin, Quapaw, Commerce, North Miami and Miami, as well as smaller towns and the county itself encompass the mining district. While no mining occurred as far south as Miami, the town's public areas such as parks and school grounds are laced with chat brought in as fill by the town over many years. Currently the Oklahoma Department of Environmental Quality and the EPA are funding the City of Miami to remove the chat-laden soils to a site scheduled for reclamation later.

The Federal and state agencies with authorities to work on some aspect of this very complex site have coalesced into a workgroup that communicates routinely and attempts to leverage the resources available to attack the complexities of this mega-site from a variety of angles. Coordination with all of these entities is carried on in two ways. First, the US Environmental Protection Agency (EPA), the US Army Corps of Engineers (COE), and the BIA signed a Memorandum of Understanding (MOU) formally pledging to work together and with the State of Oklahoma and the Quapaw Tribe to come up with comprehensive, holistic management plans for the entire area. Since the initiation of this workgroup, downstream tribes have asked to be joined in these efforts, and the States of Kansas and Missouri, recognizing that the watershed includes both surface water and groundwater that travels though the mining areas in their states, have all asked to work together towards comprehensive solutions.

The second impetus for coordination comes from the state legislature designating a Tar Creek Coordinator funded originally from state Rainy Day money in 2003. The coordinator routinely contacts federal and state agencies as well as Tribal governments to track progress and to suggest ways of leveraging information from disparate projects into the broader planning needed for Tar Creek. Since each of the Federal Agencies is limited in the scope of their authorities, the intent is to look beyond the routine for ways to add value to each funded project. Progress had been stalled on several fronts for several years. However, with the increased support from the Oklahoma Legislature and both Governors Keating and Henry as well as Oklahoma's congressional delegation money and concerted efforts are now being directed toward permanent, long-term solutions to the many problems associated with Tar Creek. While cleanup in Picher and Cardin proceeds, the 2004 legislature passed SB 1490, proposed by Governor Brad Henry, to authorize $3 Million to buy out families with children under 7 living in the heart of the mining district. A local trust will manage the process.

The Oklahoma Plan for Tar Creek, funded by appropriations from Senator Inhofe's work on the Environment and Public Works Subcommittee, directs actions that will clean up large amounts of land and streams where large chat piles used to sit adjacent to residential areas while the EPA and Corps of Engineers long-term planning processes determine how to handle the very large chat piles and millponds at the center of this site. The Oklahoma Plan includes paving the dirt roads to reduce dust and use up chat; filling in mine shafts and sinkholes; passive treatment of the mine seeps to settle out the metals; and land and stream restoration.

The many years of mining, plus the scars created by the mine waste left behind will take time and patience to remedy.

A complete remedy requires the various government agencies that are or who should be involved to look beyond their traditional boundaries and help to meld a creative complex of solutions for this important part of Oklahoma's past- and future.

END NOTES

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Urban Sprawl in Oklahoma

Robert Gregory and Anita Poole, Kerr Center for Sustainable Agriculture

Throughout our history, Oklahoma has been characterized as a land of wide open spaces, rolling prairies, and vast farms and ranches. Only recently have opinion leaders and public officials begun to consider the affects of urban sprawl in our state, particularly around the two largest metropolitan areas. As more and more farm and ranch land is lost each year to new homes and commercial developments, Oklahomans are realizing that the growth of our cities, though welcome to accommodate new business activity, also presents challenges for preserving natural, cultural, and economic resources that have historically helped define us as a state and a land. To address these challenges, several options exist for states and communities to preserve farm and ranch lands, and Oklahoma is just beginning to pursue these options so that we can preserve some of the state's most productive agricultural lands.

The Loss of Farm and Ranch Lands

Nationally, America is losing agricultural land at the alarming rate of roughly 320 acres per hour. In Oklahoma, over 3 acres of farm and ranch lands are lost each hour to development, totaling about 30,000 acres per year. Between 1992 and 1997, Oklahoma lost over 140,000 acres of agricultural land, and the rate of loss is increasing. Most of this loss occurs near our largest communities where urban sprawl is the primary cause. Unfortunately, this very often results in some of our state's best farm and ranch lands being converted to other uses. As Oklahoma was initially settled, cities emerged along rivers and in areas where soils were rich and highly productive. Today, these lands and their prime soils are rapidly changing to non-agricultural uses. Exhibit 1 illustrates the conversion of prime agricultural lands near our largest communities.

Compounding concerns over the loss of farm and ranch lands are signs that the situation is worsening. Nationally, the rate of conversion to non-agricultural uses increased by 51% between 1992 and 1997 from the ten years preceding. Between 1982 and 1997, America's population increased by 17% while urbanized land increased by 47%. Over the past 20 years, homes consuming 10 acres or more accounted for 55% of newly developed land.

Urban sprawl occurs in Oklahoma and elsewhere as a result of four primary forces: 1) population increases and the resulting need for new homes and businesses; 2) urban decay (such as high crime rates, pollution, and other quality of life concerns) causing more and more people to move to suburbs and surrounding areas; 3) increased average land consumed for each new home, which has risen from about 1 acre per home in 1950 to nearly 2 acres per home today; and 4) economic factors that encourage conversion of land to non-agricultural uses. These forces can readily be seen in the Oklahoma City and Tulsa metropolitan areas, along with smaller cities such as Lawton, Norman, Edmond, Broken Arrow, Owasso, and several others across the state. At current rates of land use, the loss of agricultural lands will only worsen as Oklahoma's population grows to a projected 4.676 million in 2030 (from 3.45 million in 2000).

Urban sprawl presents concerns and challenges to Oklahoma and other states in addition to the loss of our best farm and ranch land. Numerous studies across the nation have indicated that low-density residential development does not pay for itself. The cost of providing public services to these areas, on average, is less than new tax revenue generated. Essential natural resources such as

water, timber, and soils are consumed. Floodplains are affected, as are air and water quality. Traffic congestion, impact on scenic views, and loss of recreational lands are other concerns related to urban sprawl.

What Can Be Done

To minimize the negative impacts of urban sprawl, public agencies and nonprofit organizations must work collaboratively to address the primary causes of sprawl. These include investments in improving the quality of life in our cities to attract and retain residents in our urban cores, encourage sustainable development practices that conserve land and natural resources, and employ market-based techniques to financially assist landowners who wish to continue farming and ranching.

Responding to concerns over urban sprawl and its effects, communities across the nation and in Oklahoma are taking steps to reduce the negative impacts of urban sprawl. Among these efforts are measures taken to revitalize urban centers, attract new residents and new economic activity, and improve the quality of life. Foremost among them is MAPS in Oklahoma City and Vision 2025 in Tulsa County. Main Street revitalization programs are common in communities across Oklahoma. These types of efforts typically include investments in infrastructure, public facilities, and recreational resources such as parks and trails that help to enhance the quality of life in our urban cores.

Three communities in Oklahoma have been especially aggressive in addressing urban sprawl. The City of Norman established a citizens' commission that developed plans for the creation of an expansive greenbelt of protected open space (largely farmland) along the city's northern and western boundaries. Aided by the work of the Norman Area Land Conservancy (a nonprofit organization), the City is acquiring conservation easements on working agricultural lands in the proposed greenbelt areas by matching city funds with USDA grants through the Farm and Ranchlands Protection Program (FRPP).

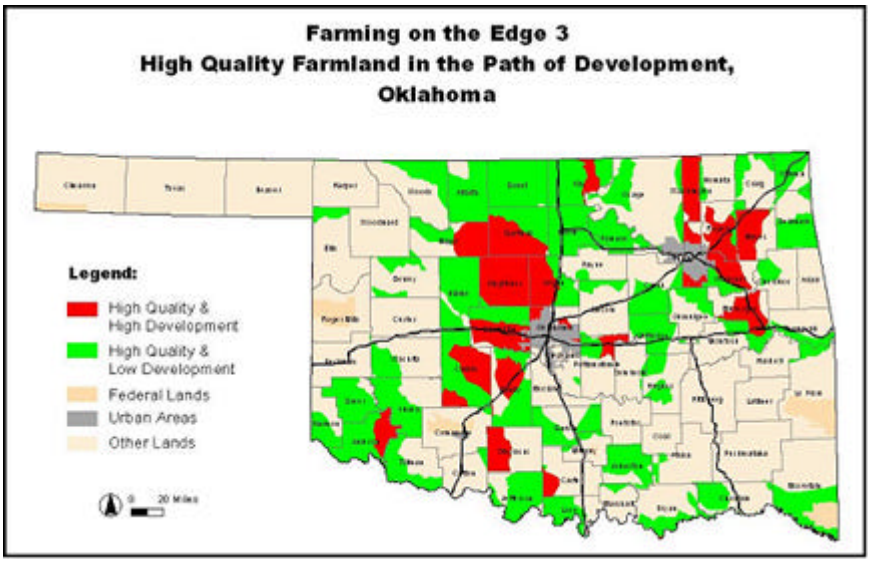
The City of Edmond recently completed the "Edmond Greenprint," a long-term plan for protecting natural resources, encouraging sustainable development, and creating outdoor recreation opportunities. Resulting from the Greenprint, the City established a nonprofit organization, the Edmond Land Conservancy, to assist in land protection efforts, implementation of the city's trails plan, and promotion of sustainable development practices.

The City of Lawton and surrounding communities in Comanche County are working with the Department of Defense, various federal agencies, and a statewide nonprofit conservation organization, Land Legacy, to protect working agricultural lands surrounding Fort Sill Army Base. As urban sprawl in the Lawton area has led to residential and commercial development on the installation's perimeter, military training activities at Fort Sill have been altered to minimize impacts from noise and other concerns. Lawton and other communities are working to preserve the ranch lands surrounding Fort Sill to help safeguard its role as a major training installation and to conserve natural resources.

For these and other efforts to successfully reduce the impact of urban sprawl in Oklahoma, farmers and ranchers in the path of development must be rewarded for keeping their lands in agricultural production. As land values near our communities increase rapidly, and as farm incomes remain stagnant, the economic pressures for landowners to sell agricultural lands for other uses are simply too great. A number of organizations such as the Kerr Center for Sustainable Agriculture are working to create new economic opportunities, such as local farmers' markets and development of specialty crops, to make agricultural production more profitable. By creating new markets and marketing opportunities, the Kerr Center and others hope to reduce the loss of agricultural lands near our cities by making farming more profitable.

Several organizations in Oklahoma, notably Land Legacy, are working to reduce the loss of

agricultural lands from urban sprawl through the acquisition of conservation easements. Conservation easements allow landowners to sever and convey through donation or sale a property's development rights while retaining ownership and the right to farm or ranch the property. Donations of conservation easements are generally tax deductible for up to 30% of a landowner's adjusted gross income and can be spread out over six years. Or, a conservation easement may be appraised and sold at its fair market value. Since January of last year, Land Legacy has protected over 1,500 acres of agricultural land across Oklahoma, entirely through donations of easements. Additionally, they are working to raise roughly $2 million to match challenge grants from the Farm and Ranch Lands Protection Program for the purchase of conservation easements on another 1,200 acres of farm and ranch lands, most of which is surrounding the Oklahoma City, Tulsa, and Lawton areas.



Across the nation, 24 states including Colorado, Florida, and New Jersey are providing funds for local government and nonprofit organizations to protect agricultural lands from conversion. Some states take a more regulatory approach forcing developers to obtain credits from Permanent Development Rights from other landowners prior to receiving building permits. In most cases, state funds are used to match federal programs such as the FRPP or local investments to reduce the impacts of urban sprawl. In Colorado, for example, lottery proceeds are awarded on a competitive basis to communities to be matched from other sources to conserve agricultural or recreational lands. In total, these 24 states have invested over $1.5 billion which, when combined with matching sources, has led to the protection of more than 1.3 million acres of farm and ranch lands. Oklahoma does not have such a program and has not qualified for its share of federal matching funds for open space protection. (The Farm and Ranch Lands Protection Program, for example, provides roughly $100 million per year nationally, though to date Oklahoma has only received $25,000.)

Conclusion

Urban sprawl is among the leading causes of the loss of productive farm and ranch lands throughout the nation, including Oklahoma. Currently, we are losing roughly 30,000 acres of prime farm and ranch lands each year across the state. As land use and population trends continue, the loss of our best agricultural land will become more severe. Several communities and nonprofit organizations have begun efforts to reduce the negative impacts of sprawl and prevent the conversion of farm and ranch lands to nonagricultural uses. These efforts, however, are limited by the state's lack of a program to assist communities in these efforts and qualify for federal funding opportunities. Until the state develops a program to address the loss of agricultural lands near our cities, Oklahoma will continue to lose our best farm and ranch lands while helping fund such programs in other states.

Brownfields in Oklahoma

Rita Kottke, PhD, Brownfield Program Coordinator, Land Protection Division,
Oklahoma Department of Environmental Quality

Why Brownfields Exist

Prior to environmental regulations, there were few restrictions on the disposal of industrial waste. "Good business" dictated that the cheapest method be used, and this often meant disposal "out back."

Old industrial sites may also have residual contamination from chemical spills, improper storage or use of chemicals, and air and water emissions. Although environmental contamination on these sites may pose a threat to human health and the environment, it is the environmental liability attached to the property that dissuades buyers from purchasing brownfield sites.

Oklahoma, like the rest of the world, prizes economic development, and although it is considered a rural state, it has always had an industrial base.

The discovery and production of oil and gas fueled Oklahoma's early economy. Other industries such as lead and zinc mining and smelting, tanneries, and wood preservers also flourished during Oklahoma's early boom. Unfortunately, business fluctuates and industries close, leaving behind unemployment, boarded up buildings, "keep out" signs, and environmental contamination. If new industry is not enticed to the area urban decay sets in, followed by blight.

The Brownfields Initiative is considered a"win-win" program. Greenspace is protected from development, polluted sites are cleaned up, and economic development is allowed to proceed.

Prior to 1980, the fact that an industry previously operated on a site was not a hindrance to the reuse of the property. Industrial properties were revamped all the time. However, the passage of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, better known as Superfund) changed the way commercial real estate transactions occur in the United States.

Superfund was passed in the wake of Love Canal, a toxic waste landfill that began leaking into homes in upstate New York in the late 1970s. The realization that these "chemical time-bombs" existed across the nation, that there was no federal regulatory framework available to force a polluter to clean up his/her mess, and that there was no funding available for the government to conduct the necessary cleanup fueled the passage of the legislation.

The intent of Superfund is to make the polluter pay to clean up the environmental mess it left behind and to create a "Superfund" to clean up abandoned sites when no viable responsible party can be found. Superfund established strict joint and several liability for contamination left on property, which means that anyone who owned, operated, or disposed of waste at a site can be held responsible for the entire cost of the cleanup.

It also provided for penalties and fines for noncompliance, which can total three times the cost of the cleanup. Since Superfund cleanups can cost millions of dollars per site, the potential for this liability dissuades many potential buyers from considering former industrial sites.

Merely owning contaminated property or being in the chain of title can make a person a Potentially Responsible Party (PRP) and liable for a Superfund cleanup, even if s/he never deposited or managed waste at the site.

What Are Brownfields?
Brownfields are abandoned, idled, or under-utilized properties where perceived or real contamination has affected the sale and redevelopment of the property. The fear of becoming responsible for a Superfund cleanup dried up the demand for these sites. Lenders became leery of industrial and commercial properties and began requiring environmental assessments of the properties. One of the side effects of Superfund was that lenders became PRPs when they were caught in the chain of title (through foreclosure).

Legislation specifically released lenders from Superfund liability in 1996, as long as they did not manage the wastes at the site. However, this has not appeased the lending community, and they still have concerns about loaning money for the purchase of contaminated sites.

Environmental due diligence is required in most commercial land transactions (Phase I and Phase II environmental assessments), and often, the environmental assessments make or break the deal.

When industries close, there is a domino effect on the neighborhood. Industrial facilities are interrelated within their communities. When one shuts down, all the support services and suppliers lose business. Jobs are lost, the tax base dwindles, and the community suffers. When industries are dissuaded from reusing existing facilities due to environmental conditions, they tend to relocate to areas where there are no environmental concerns, so farmland and wilderness areas are lost to development.

New infrastructure (roads, sewers and water lines) must be extended to the new facility (usually at taxpayers' expense) and the existing infrastructure is underutilized.

In the mid-1990s, the U.S. Environmental Protection Agency (EPA) recognized that Superfund had unintentional adverse effects on the real estate market and that this effect added significantly to inner city blight. EPA began a Brownfield Initiative to rectify the situation.

Contamination is not the only deterrent to reusing industrial properties in the inner cities. Many other issues play into the equation, such as crime rates, outdated/inadequate structures, availability of a skilled workforce, an adequate transportation network, quality of life standards, etc. However, the goal of the brownfields program is only to remove the environmental roadblock to redevelopment, and hopefully, as a side effect, encourage the revitalization of the community.

What's being Done?
In the mid 1990s, EPA began an internal Superfund initiative to provide a means to cleanup and reuse brownfield sites. EPA encouraged states to create Voluntary Cleanup/Brownfield Redevelopment Programs by providing funding for states to build their capacity. It also negotiated and signed agreements with states promising not to pursue Superfund actions at sites participating in the state program.

EPA also reviewed and revised its policies to reflect the reuse initiative. Congress began discussing federal brownfield legislation, but a federal Brownfield law was not passed until January 2002.

Oklahoma has operated a voluntary cleanup program since the mid 1980s. The program allowed people to cleanup property under state oversight, but provided no means of releasing the participant from environmental liability.

The Oklahoma Brownfield Voluntary Redevelopment Act of 1996 provided the Oklahoma Department of Environmental Quality (DEQ) the authority to grant a release from state liability to an applicant that successfully completed the program. The DEQ signed a Memorandum of Agreement with EPA in 1996, whereby EPA promised not to pursue Superfund actions at sites in Oklahoma's Brownfield Program.

In 2002, the federal Small Business Liability Relief and Brownfields Revitalization Act formally barred EPA from taking Superfund enforcement actions at Brownfield sites. Federal and State financial incentives were also passed to encourage the cleanup and reuse of brownfields.

The major goal of brownfields redevelopment is to cleanup and reuse contaminated property. All brownfield cleanups are based on the risk that the environmental conditions pose to the reuse of the property. The brownfield program requires that a future use be designated and that the cleanup be appropriate for that reuse. Reuse designations are residential, commercial, industrial, and agricultural.

For example, residential reuse takes into consideration that young children will be exposed 24 hours a day; whereas, industrial reuse assumes that adults will be exposed for eight hours a day. The risk analyses are site specific and determine the cleanup levels for each site. Risk analysis is important for brownfield cleanups because it allows the cleanups to be economically feasible.

Sustainability

The concept of brownfields is a piece of the sustainability puzzle. The Brownfields Initiative tore down the environmental roadblocks that precluded the reuse of industrial and commercial properties. This helps cities recruit business back to the inner city and brings jobs to neighborhoods that desperately need economic growth. Brownfields helps prevent further urban sprawl and preserves farmland and wilderness areas by ensuring that great business locations along existing infrastructure are reused.

Finally, the Brownfield Initiative ensures that contaminated property will be properly cleaned up without taxpayers footing the bill.

The Brownfields Initiative is considered a“win-win” program. Greenspace is protected from development, polluted sites are cleaned up, and economic development is allowed to proceed.

The EPA Says ...

Since its inception in 1995, EPA’s Brownfields Initiative has grown into a proven, results-oriented program that has changed the way contaminated property is perceived, addressed, and managed. EPA's Brownfields Program is designed to empower states, communities, and other stakeholders in economic redevelopment to work together in a timely manner to prevent, assess, safely clean up, and sustainably reuse brownfields.

It is estimated that there are more than 450,000 brownfields in the U.S.

EPA’s investment in the Brownfields Program has resulted in many accomplishments, including leveraging more than $5 billion in brownfields cleanup and redevelopment funding from the private and public sectors and creating approximately 25,000 new jobs. The momentum generated by the Program is leaving an enduring legacy.

The Brownfields Program and its partners have provided guidance and incentives to support economic revitalization, and empowered communities to address the brownfields in their midst. EPA's Brownfield Program continues to look to the future by expanding the types of properties it addresses, forming new partnerships, and undertaking new initiatives to help revitalize communities across the nation.

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Air Quality in Tulsa: "An Ounce of Prevention ..."

Jerry Lasker, Executive Director, Indian Nations Council of Governments

On April 15th, 2004 the Tulsa area was designated attainment of the revised National Ambient Air Quality Standard for ozone. Since the entire state of Oklahoma received the same "clean-air" designation, Tulsa's unique and extraordinary progress of the past fourteen years leading to this designation could mistakenly be minimized. It would additionally be a mistake to assume that Tulsa's 2004 ozone attainment designation leaves the area "in the clear" for the air quality future.

Tulsa's future brings new business opportunities, existing business expansion, and cultural opportunities, roadways that provide expanded access across the metropolitan area, economic prosperity and exemplary quality of life for our community. Economic growth however, is almost always partnered with challenges to maintain clean air quality for its community. Tulsa is not unique in this challenge though fully unique in its approach to meeting the challenge of balancing growth, economics and clean air. Our air quality philosophy is neatly summed up in the old adage, "An Ounce of Prevention is Worth a Pound of Cure". It is this philosophy which has kept the Tulsa area in compliance with federal Clean Air Act standards.

The Clean Air Act provides that EPA sets and enforces the nation's acceptable levels of ambient air pollution. Areas in violation of EPA air quality standards not only have poorer air quality, but suffer the negative economic consequences a nonattainment designation brings. Once EPA designates an area nonattainment, that area is required by the Clean Air Act to develop a plan (State Implementation Plan) defining specific and usually costly clean-up measures. Establishing mandated emission reduction programs is accompanied with federally defined stricter standards for existing and new area industry. Consequently, new businesses are often reluctant to locate in nonattainment areas and existing business find it more expensive to expand.

In the early 1990's, shortly after regaining attainment status, Tulsa ozone monitors began to register exceedances of the ozone standard. As Tulsa was faced with the prospect of going back into nonattainment, area officials turned to INCOG, the Council of Governments in the Tulsa area, to develop a pro-active program to diminish the chances of slipping back into non-attainment. INCOG formed an Air Quality Committee composed of local public agencies, the business community, environmental interest groups, and other interested citizens. In just two weeks time, the Air Quality Committee developed and implemented what is now known as the nationally acclaimed Ozone Alert! Program – the first voluntary episodic ozone prevention program of its kind. Also resulting was the development of a strong proactive coalition of stakeholders committed to clean air.

An important part of the Tulsa's Ozone Alert! Program was a voluntary effort by gasoline suppliers to provide lower evaporative, consequently cleaner burning, gasoline during the ozone season. Hydrocarbon emissions, also referred to as VOCs, react with nitrogen oxide emissions to form unhealthy ozone during certain summer meteorological conditions. On and off-road gasoline engines are a primary source of ozone-forming VOCs and consequently cleaner-burning gasoline programs are often an initial federally mandated control strategy for nonattainment areas. During that first 1991 ozone season, the Reid Vapor Pressure (RVP) of the gasoline provided at Tulsa area stations was 8.5 psi or lower rather than the maximum 9.0 psi which would have otherwise been supplied. Additional components of the voluntary Ozone Alert!

Program included Tulsa Transit providing free bus rides on Ozone Alert days, voluntary support from business and industry, and education and outreach efforts to encourage the public to limit using vehicles, carpooling, filling up their tank at night, and avoiding using gas powered lawn equipment on Ozone Alert! Days. The proactive effort of our Ozone Alert! Program has resulted in our area remaining in attainment.

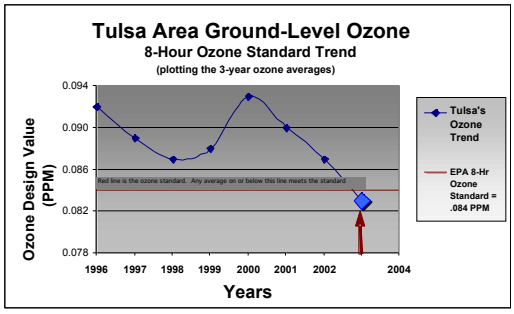
The EPA revised the ozone standard in 1997, and the Tulsa area realized an even more significant challenge to staying in attainment. Compounding air quality challenges, in 2000 when gasoline prices were spiking across the nation, Tulsa was again facing the very real possibility of a nonattainment designation. Ozone levels clearly violated the revised standard and only legal challenges, at the national level, delayed EPA's looming nonattainment designation. Again, the INCOG Air Quality Committee pulled together area stakeholders and through a series of roundtable discussions, gasoline suppliers voluntarily lowered the RVP to the cleaner 7.8 psi program we have today. Our gasoline suppliers tell us that the cost of lowering the RVP is not passed on to our consumers, though production cost can be two to four cents per gallon more than 9.0 psi gasoline.

Since 2001, our ozone levels have improved dramatically (See Graph 1). The Tulsa area has enjoyed recent success in meeting the new EPA 8-hour ozone standard. However, our maintaining attainment status is by no means assured as the vagaries of another Oklahoma summer must be added into the mix. To this end the Tulsa area has entered into an Early Action Compact (EAC) with the State and EPA. The EAC will allow us to defer the consequences of non-attainment should we violate the ozone standard as long as we meet specific action milestones to clean our air at an early date.

As part of the EAC effort, air quality modeling must be accomplished to predict how the area will fare in the future in meeting the standard. To fulfill EAC obligations, the State contracted for the development of a preliminary photochemical model to project state-wide ozone conditions. This initial ozone model does not accurately demonstrate conditions specific to the Tulsa area, and in fact indicates we will be violating the standard in 2007. We are pursuing the development of a modeling analysis that more accurately reflects ozone conditions specific to the Tulsa area. It is critical that we have a realistic evaluation of appropriate emission reduction control measures to assure that we will continue to meet the ozone standard in 2007.

Tulsa area residents are educated, concerned and proactive about air quality issues. A recent public opinion survey was conducted of residents in the Tulsa metropolitan area. Residents were interviewed as to their awareness of and attitudes toward air quality in Tulsa, as well as the Ozone Alert! Program. The research found that 80% of Tulsa area residents are familiar with the Ozone Alert! Program and an amazing 78% indicate they generally take some action to limit ozone-forming emissions on those days. In a testimony to Tulsa's clean-air progress, remarkably three-quarters of the residents surveyed were able to provide an accurate and specific answer to the open-ended question of how they personally could help to improve air quality in the Tulsa area.

"What is the cost of nonattainment?" A pound of cure. Better asked, "What is the Cost of staying in attainment?"....merely an ounce of prevention. The Tulsa area Ozone Alert! Program is fourteen years strong"– fourteen years of air quality successes, determined progress, and economically wise choices through voluntary programs.



Air Quality in Oklahoma City: "Any Way The Wind Blows ..."

Zach D. Taylor, Executive Director; and Jerry A. Church, Special Programs Officer Association of Central Oklahoma Governments

Air quality status essentially "blows like the wind." Its continuous motion makes the administrative efforts that manage it, and the policies that regulate it, to also be in constant change.

Oklahoma…where the wind comes sweepin' down the plain. And like the wind, our state's air quality status stays adrift, like a leaf caught in an air pocket, teetering on the brink of rising up, or falling down to the ground.

powerless to manage aberrant weather conditions. Unless man can rule the wind, the clean air status of Central Oklahoma has the potential to change with each summer day.

In December 2003, the Environmental Protection Agency (EPA) sent a letter to the state of Oklahoma that recognized the state to be in full attainment for the criteria pollutant known as ground level ozone, or smog. The announcement had been expected for months, based on ozone readings from the summer of 2003, but the official decree from EPA still came as a significant pronouncement that validated years of voluntary community efforts in the Central Oklahoma region.

EPA based its designation for the state on a three-year set of data from 2001-2003. Based on these readings, the Central Oklahoma and Tulsa metro regions were recognized to be in full compliance with federal standards. This data group was decidedly better than the measurements culled from 1999-2001. For a time, as the legality of the standard worked its way through the halls of administrative law, these numbers stood to put the Central Oklahoma region out of attainment, albeit briefly.

The prospect of the Oklahoma City metro being placed on the federal "dirty air list" was discouraging. The Central Oklahoma region is growing, and forecasts by the Association of Central Oklahoma Governments (ACOG) for the year 2025 showcase a 47 percent increase in vehicle miles traveled. As the metropolitan Oklahoma City area broaches the 2004 ozone season, leaders can now identify the rules, but are

Riding the Wind

In the letter of attainment, EPA commented that "voluntary efforts in the state helped to improve air quality," and noted that the efforts were especially important regarding early air quality planning in both regions.

In Central Oklahoma, the goal to maintain clean air status has always focused on self-preservation and proactive community action. In order to get an "A" grade, one must put forth "A" efforts. Ask any college student why he or she waited so long to write a term paper, and the token excuse is usually that the looming deadline just kind of "snuck up." When it comes to addressing air quality issues, our region never waits until the midnight hour.

The Central Oklahoma region became a Flexible Attainment Region for carbon monoxide in 1991, after a decade of perseverance that culminated with the amended Clean Air Act of 1990. During this time, carbon monoxide subsided as the primary pollutant of concern, and was replaced by ozone.

To counter this emerging threat, ACOG, the Oklahoma Department of Environmental Quality, OGE Energy Corp. and multiple collaborators implemented the Clean Air Alert Day program. This program promotes discretionary advice that every citizen can employ in order to reduce the chances of ozone build-up. A forecast (dispersion

index model) which studies weather patterns, wind direction and other factors is made a day in advance so clean air partners can get the word out to the media, businesses and the public.
After a decade, the program has gained recognition and has been proven to influence the average Central Oklahoman.

An independent poll conducted for ACOG in 2003 indicated that 73 percent of residents recognized air quality as an important issue, and a proportional percentage were willing to make a personal commitment toward the cause. When asked what they did to combat ozone on a Clean Air Alert Day, over half of those polled had postponed lawn mowing and lawn care activities. A great number had stopped "topping off" their tanks when gassing up their vehicles, and over 54 percent made attempts to refuel their vehicles in the evening, when ozone has less of a chance to form.

These are all examples of the recognition of the importance of clean air in Central Oklahoma, and how public action"– and reaction – can help the greater good.

Something in the Air
Among the substantial findings in the 2003 poll was the role that health played in influencing citizen behavior. While much of the message of clean air revolves around regional economic development and quality of life, the subject that drew the most attention was the potential negative impact that bad air quality can have on the health of our families and friends. With over 66,000 people in Oklahoma County susceptible to asthma, allergies and respiratory illnesses, reminding citizens that clean air equated to better health was an easy sell.

Good health is an emerging public policy issue that has gained substantial grassroots momentum. A wide-ranging group of public partners recently outlined goals and objectives to improve the health of all Central Oklahomans. The goal of the Central Oklahoma Turning Point initiative was to put health on the map. The plan now rests in the hands of citizens to carry out, and like air quality, it is theirs to navigate.

Full Sail Ahead
But where to sail, and where to go? Much of the work until now has been proactive and voluntary. Both the Tulsa and Central Oklahoma regions have enrolled in EPA's clean air Early Action Compact program. The compacts showcase air-friendly commitments by communities, governments and corporate stakeholders. For example, municipalities throughout the state are implementing improved transportation systems designed to reduce congestion, improve traffic flow and advance transit services. Clean-burning alternative fueled vehicles are also increasing in use, as more government and private fleets realize the value of clean air and the efficiency of alternative fuels.

There are other fallback plans that may become necessary. In the future, there may be a need for the state legislature to reinstitute a mandatory vehicle inspection program that would include an emissions test. This would be problematic, but may become necessary to identify motor vehicles in need of repair. The emergence of low-reid vapor pressure (RVP) gasoline (successfully piloted in Tulsa) would also benefit the state in that it burns cleaner and emits fewer pollutants. While EPA has recognized low RVP fuels as having tangible benefits as an alternative strategy in combating ozone development, by Congressional caveat, it cannot allow Oklahoma to mandate its use as a preventative strategy.

Maintaining our air quality status is almost more challenging than regaining it. A long summer of untenable weather and public apathy could put us back in an uncomfortable situation, so due diligence and attention to the issue must be preserved. As Oklahomans, we must continue to work together to make clean air a state commodity that we can proudly promote. Like the wind, it blows in different directions, but we can find ways to foster it, by staying the course and charting new paths.


Get
your
own
square
of
clean
air

Recycling in Oklahoma?

Michael Patton, Executive Director, The Metropolitan (Tulsa) Environmental Trust

Recycling generates significant economic benefits for communities. In fact, the Office of the Federal Environmental Executive estimates that recycling and remanufacturing industries account for approximately 1 million manufacturing jobs and more than $100 billion in revenue annually. Oklahoma shares these jobs in recycling, with 5,000 jobs and a $200 million dollar annual payroll in the top 20 recycling business manufacturers alone. Many of these manufacturers—including a recycled paper plant in Muskogee, a steel recycling plant in Sand Springs, and a bottle plant in Sapulpa—are the largest private employers in those communities.

Recycling in America employs low-, medium-, and highly skilled workers in a variety of jobs—from materials handling and processing to high-quality product manufacturing. The drive for efficient handling and use of recycled materials spurs innovation, key to long-term economic growth. Equally important are the social and environmental benefits of recycling. Recycling promotes the sustainable use of our natural resources. Recycling activities promote community development while reducing the need for new landfills, preventing pollution, saving energy, and greatly reducing greenhouse gas emissions.

The greatest environmental benefit of recycling is not saving landfill space or preventing contamination of the land and water from burned or buried wastes, but from the conservation of energy and natural resources when recycled material, rather than a raw material, is used as feedstock to make a new product. Since recycled materials have been refined and processed once, manufacturing the second time around is much cleaner and less energy-intensive. By decreasing the need to extract and process new raw materials from the earth, recycling can eliminate the pollution associated with the first two stages of a products development: material extraction and processing. In Oklahoma, one needs to go no further than the northeast corner of our state to the Tar Creel superfund site to witness the environmental harm these processes can impose.

One half of the citizens of Oklahoma now have access to curbside recycling and three fourths of Oklahomans have this service or a recycling drop-off center within five miles of their homes. Yet Oklahoma's recycling diversion rate is well-below 10% of waste generated. This compares to almost 20% for Kansas, over 30% for Texas and 35% for Arkansas. It is estimated that only one in five Oklahomans will actively recycle on a regular basis. This puts a difficult burden on Oklahoma recycling manufacturers to pay additional shipping costs for necessary recycled feedstock. Each of these other states do three things differently than Oklahoma when it comes to solid waste and recycling—they have a stated goal for recycling diversion, they give recycling tax credits to private industry, and they use the majority of the collected landfill tipping fees to promote recycling infrastructure.

More than 40 states have a diversion goal for recycling, looking to have anywhere from 20% to 50% of the trash generated in the state diverted to recycling. While measurement is difficult, the Environmental Protection Agency has developed some guidelines for consistency that should be used. Many states pass down these stated goals to municipalities, requiring approved plans to reach diversion goals. If legislators take the relatively simple step of agreeing to a recycling goal, stakeholders like community public works officials, venture capitalists, and waste/recycling haulers would see increased opportunity for investment and growth. However, these measures have not been consistently demanded by these stakeholders in Oklahoma to date.

Establishing recycling tax credits for private industry is direct support for recycling. In 2003, Arkansas certified 31 tax credit applications for nearly $15 million. In the 12 years of the program, over a hundred businesses have invested more than $375 million in recycling, creating over 1,600 jobs. Oklahoma has no current tax credits targeted for recycling companies to be used for expansion or job creation.

The collected landfill tipping fee is used by most states as funding for public assistance for solid waste solutions, job creation for public sector expertise, and grants to both public and private recycling ventures. In Arkansas, districts are formed by combining like counties with a local hire of solid waste and recycling managers to assist the communities in those districts. Grants are made available to fund these positions from the fees collected at the disposal facilities. In Arkansas, the average year total for grants distributed is $3.2 million while Missouri exceeds $12 million in grant money given to promote recycling throughout the state. The $3.3 million that the state of Oklahoma receives from landfill fees is mostly spent on other, non-traditional efforts that don't promote recycling. There is only $200,000 available in grants, and then only to municipalities as a 25% match on non-rolling capital with an annual cap of $10,000.

Under current delineation of public and private sector roles in waste management, local governments are shouldering most or all of the collection and recycling costs. Recycling efforts in Oklahoma are usually seen as a response to a public demand by citizens directed only at local leaders. This demand could be additionally asked of state officials, who could offer the assistance of recycling grants, tax credits, or the public acknowledgement of a goal in recycling for Oklahoma. Oklahoma recycling has been a positive story for Oklahoma, but a few easy steps could give Oklahoma recyclers new markets, reduced shipping costs, and additional reasons to continue investment in Oklahoma.

Efforts to Boost (Oklahoma) Recycling Going to Waste

By Michael Baker, Staff Writer, Daily Oklahoman, July 6, 2004
Printed with permission from The Oklahoman

Oklahomans generate about 4.5 million tons of garbage a year, but recycle less than 1 percent. Only Mississippi recycles less, according to a recently published survey.

The reason: Plenty of wide, open spaces for cheap landfills and a lack of incentive for people to recycle, experts say.

"We haven't had a crisis here," said Michael Patton, president of the Oklahoma Recycling Center. "Unfortunately, it doesn't get people's attention until there's a crisis."

Oklahoma sends 99 percent of its trash to landfills, according to a survey based on 2002 data and released this year by the journal Biocycle and Columbia University's Earth Engineering Center. Mississippi sends 99.7 percent of its garbage to landfills, according to the survey, which included responses from 47 states. Oklahoma's numbers are "amazingly embarrassing," said Patton, also executive director of Tulsa's Metropolitan Environmental Trust.

Experts say Oklahomans likely would recycle more if they knew of recycling's benefits: environmental and economic.

Big business

"I make the case that in Oklahoma, recycling is big business," said R. Fenton Rood, director of waste systems planning for the state's Department of Environmental Quality.

"In that realm, Oklahoma is incredibly fortunate and successful," he said. "We have 19 major manufacturers in the state that use recycled materials to make their products."

Oklahoma-based companies using recycled material in manufacturing can be linked to 5,524 jobs and nearly $200 million in paychecks, according to a 2002 study by the Oklahoma State University Cooperative Extension Service and Patton's trust.

Georgia-Pacific in Muskogee uses only recycled paper to produce tissue products, Sheffield Steel in Sand Springs recycles scrap steel, and Weyerhaeuser in Valliant recycles cardboard to make liner board for boxes. "They would rather get all their recycled material from Oklahoma because it's going to be the cheapest source," Rood said.

The problem is, it's not a plentiful source. Only about 5 percent to 15 percent of the recycled materials used by those companies comes from Oklahoma, according to the OSU study.

"If people knew that that newspaper was able to create jobs for a paper plant somewhere in the state, they'd probably see it differently," Patton said. "Oklahoma does a great job of making money off recycling, but citizens themselves don't do very much of it."

Few residents recycle

Half of Oklahomans have either curbside recycling services such as in Oklahoma City, Tulsa, Edmond, Choctaw and other places, or drop- off centers, but only about one in five residents recycle.

Bob Adams of Oklahoma City said he recycles. "According to the landfills and everything, it is important to do," he said. "It keeps it off the streets, too."

Oklahoma falls in line with the regional trend, said Michele Raymond of Raymond Communications, which analyzes state and local recycling programs.

"A lot of Southern states aren't doing that much," she said. "Most of the action has been in the really green states."

Nationally, recycling efforts have leveled off around 25 percent since the big push began in the late 1980s, Raymond said. Oklahoma City shows a downward trend.

In 2001, residents produced 241,508 tons of trash, with 10,480 tons recycled, or a little more than 4 percent. In 2003, there were 282,682 tons of trash produced, with 9,266 tons recycled, down to about 3 percent.

Patton said cheap and plentiful landfill space has left people lackadaisical when it comes to recycling. The average cost, known as a "tip fee," to deposit a ton of trash in one of Oklahoma's 40 landfills is about $20, according to the Columbia University survey. "If it's so cheap to throw it away and Oklahoma is so full of wide, open space, what incentive is there to recycle?" Patton asked.

In states with limited landfill space, such as Massachusetts and Vermont, the fee is more than $70 a ton. Both states recycle about 30 percent of their garbage. "When the tip fee is that high, then recycling tends to happen," Raymond said. "Industry kind of makes it happen one way or another."

Several state governments have set goals for diverting solid waste from landfills. Pennsylvania and Arkansas officials try to recycle 35 percent of waste. California officials threaten municipalities with penalties if they don't keep at least half of their trash out of landfills.

Oklahoma is one of six states with no stated goal, Patton said. "Most of those goals were developed in the '80s and early '90s, and they were developed in response to perceived landfill crises, and we just never experienced that type of crisis in Oklahoma," Rood said.

Patton said it's time for the state to offer incentives for local governments to push recycling.

Kansas and Arkansas convert landfill fees into millions of dollars in grants and education for recycling programs, Patton said, adding, "Oklahoma offers very minimal assistance for recycling."

'More valuable than trash'

One key area where Oklahoma could improve is the recycling of yard trimmings or other green waste along with education efforts, Rood said. "About 20 percent of what we throw away in landfills every year ends up being green waste," he said.

In Oklahoma City, half the trucks hauling trash to dumps in the summer double their trips to landfills to accommodate yard clippings, said Marsha Slaughter, director of water and wastewater utilities. City officials are looking into ways to educate people about composting, she said.

Oklahoma City resident Jack Jungroth has three composting piles in his back yard. "It's hard to get anybody excited about it," he said, adding that he recycles to protect environmental resources.

"Where we can use it very, very productively is that organic material is integral in land restoration when you look at cleaning up some of the historical scars from the early day oil field development and the early day mining," Rood said.

Patton said education efforts could be the answer to lack of recycling.

"It's just so cheap to throw it away, and no one's teaching people not to throw it away. The answer is to let Oklahomans know why it's important. It's just a shame to throw things away that are more valuable than trash."

social

Human Behavior and Land Use

Beth Schaefer Caniglia, Assistant Professor of Environmental Sociology, Department of Sociology, Oklahoma State University

Beth Schaefer Caniglia is Assistant Professor of Environmental Sociology at Oklahoma State University. She has served as a consultant for the NGO Steering Committee to the United Nations Commission on Sustainable Development and the South African Department of Water Affairs & Forestry pertaining to stakeholder participation in the achievement of sustainable development. Dr. Caniglia serves as a member of the Board for the Oklahoma Sustainability Network. *The author wishes to express sincere thanks to Su sie Shields, Lintha Wesner, Russel Klaus, Pat Copeland, Lisa Vogel, and John Frey for their comments and assistance related to this article.*

Introduction

Beginning with the institution of federal land management mandates in the 1970s, the debate regarding this sensitive balance has heightened over time. Scientific understanding of the complexity of ecosystems has mounted in recent decades, providing new tools for sustainable ecosystem management. However, these new land management tools confront recalcitrant implementation barriers when they clash with long-standing sentiments regarding private property rights as symbols for democracy and freedom (Meitz, 1995).

David Schmidly, mammologist, system CEO and President of Oklahoma State University, writes: "The concept of sustainable ecosystem management is rapidly gaining acceptance as an appropriate basis for managing public lands in the United States, but we know very little about how to adopt it to private lands" (2002, p. 455).

Given that approximately 95% of Oklahoma lands are privately owned, one of the most critical issues affecting the sustainable ecological management of Oklahoma land is the struggle to balance private property rights and sustainable ecosystem management.

Addressing this challenge is particularly poignant for Oklahoma, which ranked number forty-two in 1995 among the fifty states in percentage of land owned by Federal and State governments (National Wilderness Institute 1995). Only eight states had more land under private ownership than Oklahoma. This fact is significant and should play a central role in our deliberations regarding present and future strategies for the achievement of sustainable development in our state.

Toward this end, I offer below a discussion of three recommendations that will enhance institutional and citizen capacities to advance Oklahoma's sustainable development goals in the context of private property ownership.

Briefly stated, I recommend place-based environmental education, enhanced citizen engagement in the articulation of sustainable land management strategies, and the calibration of comprehensive planning and the implementation of such plans.

These recommendations flow from my scholarly and professional experience as an environmental sociologist studying sustainable development policymaking at the United Nations Commission on Sustainable Development and in various sectors of society. They are also informed by my involvement in Oklahoma sustainability-related organizations and initiatives.[1] In essence, the argument I make is that institutional and citizen capacity building through the recommended steps will enable Oklahoma to develop the cultural framework required to reconcile extant conflict (whether real or

perceived) regarding the balance between private property rights and sustainable ecosystem management in Oklahoma.

Recommendation #1:
Facilitate Place-based Environmental Education for All Citizens in Oklahoma

Access to environmental education has increased exponentially in recent years. It is arguable that today's school-age children are more aware of environmental issues than many of their parents, which is a testimony to the success of environmental education initiatives.

Environmental education could be more successful for Oklahoma, however, if it systematically incorporated place-based content. Place-based environmental education is designed to foster concrete understanding of how general patterns of human-environment relations impact particular landscapes and communities, historically and currently. It enables people to envision at the local and regional level abstract concepts such as biodiversity, desertification, and contamination.

Perhaps most importantly, place-based environmental education has been highlighted by the U.S. Environmental Protection Agency as an important tool that fosters informed citizen participation and improved comprehensive planning processes (EPA 2003); thus, it is a precursor to the other recommendations that follow. In its own right, however, facilitating formal and informal place-based environmental education increases the effectiveness of our sustainable ecosystem management policies by building upon past successes.

As Oklahoma follows the nation-wide trend toward urbanization, land management policies are increasingly influenced by citizens and policy makers whose daily involvement in management of the vast majority of our lands is limited. By 2000, sixty-five percent of Oklahoma's population lived in areas classified as urban. Historically, however, the economy and culture of Oklahoma has been inextricably tied to land: the land run and the Dust Bowl, when studied as historical events, merely scratch the surface of the indelible imprint land and human behavior have exerted upon one another in our state. Recovery from the Dust Bowl'– economically as well as ecologically – challenged Oklahoma to develop and implement creative, cooperative solutions that facilitated more sustainable ecosystem management strategies in the context of private land ownership.

Many may prefer to look forward instead of back for solutions to present-day environmental challenges, yet successes in Oklahoma history provide suggestions for how to proceed.

Place-based environmental education can provide more intimate awareness and understanding of sustainable ecosystem management challenges among our urban residents and policy makers; it may also provide the most relevant and culturally-acceptable suggestions for how to productively approach sustainable ecosystem management in our private property context.

Several statewide initiatives currently serve to foster place-based environmental education, including the Oklahoma Association for Environmental Education (OKAEE) and the Oklahoma Sustainability Network, among others. Place-based environmental education can easily be integrated into existing primary, secondary and higher education courses with the inclusion of Oklahoma case studies designed to illustrate general environmental concepts.

Informal education, frequently provided by local and state agencies, can enhance citizen understanding by connecting their focus on Oklahoma's natural environment with broader trends observable at the national and international level. The outcome will surely be a deeper understanding and appreciation of Oklahoma's specific environmental heritage, the sustainable ecosystem management challenges we face, and the steps we are taking to meet them.

Recommendation #2:
Increase the Scope and Authority of Citizen Engagement in the Creation of Oklahoma Sustainable Land Management Policies

Citizen engagement in the creation of public policy in America is widespread. Common methods used to inform and invite feedback from citizens include the organization and announcement of public hearings, public comment solicitation, creation of citizen advisory boards and mediation juries, among others. It is widely cited in scholarly literature that citizen engagement in the policy making process increases the effectiveness of the law by enhancing citizen understanding, improving the likelihood of compliance, and reducing the occurrences of policy related law suites (Stern and Fineberg 1996). Citizen engagement is especially relevant in the creation of effective environmental policy, since, more than most other policy arenas, environmental law is reliant upon an ever growing, complicated body of natural science.

While Oklahoma natural resource agencies adhere to State Statutes that require citizen engagement in the policy making process, our current methodologies do not adequately facilitate the extensive participation and investment of landowners or confer the authority required to bridge the private property rights/sustainable land management divide in our state. Emerging best practices for citizen engagement in the achievement of sustainable development offer sophisticated tools, such as multi-stakeholder dialogues (Hemmati 2002) and analytic-deliberative approaches to the creation of science-related policies (Stern and Fineberg 1996).

Without increased, meaningful landowner engagement in the articulation and implementation of land management strategies, sustainable development will remain trapped in an unnecessary stand-off between property rights advocates and environmentalists.

Effective citizen participation in the enhancement of sustainable ecosystem management in Oklahoma requires that state and local authorities commit themselves to the processes and the outcomes. This entails building their own capacities through education on current best practices, developing outreach initiatives that encourage representation across diverse constituencies, and establishing the political will required to implement the outcomes of citizen engagement processes. With the ownership of our lands predominately private, we can best foster sustainable ecosystem management by engaging our landowners in the process.

Recommendation #3:
Calibrate the Creation of Collaborative Comprehensive Plans and Implementation of Land Use Standards

One of the most promising mechanisms for enhancing landowner participation, investment and authority in the development of sustainable land management policies lies in the link between comprehensive planning initiatives and the authority to implement land use standards. Oklahoma law is lax in this regard. While most cities and townships are required to produce a development plan, plans do not have to be updated by law, and city councils are not required to adhere to their plan when making land use decisions (Preservation Oklahoma, Inc.). Political will among city councils varies widely within the state when it comes to calibrating their zoning decisions with their comprehensive plans. However, despite the lack of convergence often found between comprehensive development plans and land use decisions taken by city councils, Oklahoma citizens and landowners continue to make impressive time commitments to comprehensive planning processes.

There is an oft-heard adage that planning is neither a highly respected nor a politically powerful field in our state. Such an argument deserves consideration, since comprehensive planning is cited by the World Health Organization, the UN Commission on Sustainable Development and Agenda 21 as central to the achievement of sustainable development, including public health, profitable industrial growth, and ecosystem integrity. Given that citizen landowners continue to be engaged in the comprehensive planning

process more than many other citizen engagement opportunities, they should be a focus of our efforts to harmonize private property interests with sustainable land management.

Toward this end, policies should be considered that require periodic up-dates of comprehensive planning documents; comprehensive plans should continue to be developed with broad citizen input; and planning documents should be better calibrated with land use decisions taken by local authorities.

Conclusions

In its effort to insure sustainable ecosystem management, Oklahoma is faced with the necessity and the opportunity to engage private landowners. Recent decades have witnessed increasingly heated debate over efforts designed to harmonize environmental protection mandates with private property rights. Oklahoma is not unique in its need to reconcile sustainable ecological management with private property rights, since Texas, Nebraska and Indiana, among others have even higher percentages of land under private ownership. However, in the midst of this debate, Oklahoma is uniquely poised to explore solutions. Place-based education specifically focused on the cooperative strategies utilized during recovery from the Dust Bowl will be a fruitful place to begin.

Unfortunately, education alone is not enough to overcome the adversarial character that often pervades discussions of private property rights and sustainable ecosystem management trade-offs, which are frequently marked by winner-take-all frameworks. Many landowners resist the perceived slippery slope of conservation mandates and retreat behind constitutional takings provisions, while many environmentalists entreat local authorities to increase heavy-handed oversight of private lands. We cannot hope to overcome such interest group dynamics without increasing dialogue that promotes mutually-beneficial agendas. Best practices in the area of citizen engagement provide tools that facilitate such dialogue, and Oklahoma will benefit tremendously if our public agencies develop their capacities in this area. As a starting point, I suggest we focus our efforts on the comprehensive planning process, where many citizen landowners have shown initiative.

Together these strategies will contribute to building a cultural framework that supports the cooperative achievement of sustainable ecosystem management in the Oklahoma context of private land ownership. Place-based environmental education will orient our citizens to ways that specific Oklahoma landscapes are impacted by human decisions regarding ecosystem management – for better or worse. It will further increase our ability to surmount the radical flanks of private property rights and environmental movements by highlighting the cooperative achievements of Dust Bowl recovery. Such citizen and policy maker capacities will be further enhanced by an institutional framework that builds trust through engaging citizens in planning for sustainable ecosystem management and exercising the political will to implement their outcomes.

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Human Behavior and Water Use

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The search for sustainable water supplies dominated the activities of early civilizations and in many parts of the globe this is still true today. In Oklahoma, and the U.S. in general, water supply issues are not a conscious part of the daily life of the average citizen, and have fallen to the purview of municipal/state planners, and developers. Yet for the public, water supplies and water quality remain the most easily identifiable and understandable issues in the debate over sustainable development.

While most people are familiar with the concept of the hydrologic cycle, the role of ground water in this cycle and it's interconnectedness to surface water quantity and quality, is unrecognized or at least under-appreciated. Ground water can best be described as the water found in the pore spaces of the geological material beneath the earth's surface, and aquifers are geological zones, which contain usable ground water. Of the world's available fresh water supplies, 74% is found in Icecap and glaciers, 0.4% resides in lakes, rivers streams, soil moisture and the atmosphere. The remaining 25.6% is ground water. The total amount of ground water in the earth is estimated at about 1 million cubic miles. In the U.S., most surface water supplies have been identified and allocated, leaving ground water as the most likely candidate for future supply development, although roughly half of the US population already depends on ground water for a portion or all of their drinking water supply.

However, the distinction between ground water and surface water is artificial, and in many cases, transient. Depending on geology and water elevations, surface water in streams (or rivers, or lakes) may flow out of the stream channel and into an aquifer (termed a losing or influent stream) or ground water may flow into the surface water body (termed gaining or effluent stream). The latter condition predominates in Oklahoma surface waters, though a stream or river may have both gaining and losing reaches along its course, and these conditions may alter over time, due to factors such as rainfall, season or heavy ground water pumping. So during it's transport between rain and major surface water bodies, a unit of water may have transitioned between ground water and surface water many times.

Using the Arbuckle-Simpson Aquifer as a topical example we can demonstrate the importance of ground water-surface water connections to water quantity. Of the estimated 38.4 inches of annual precipitation that falls on the Hunton anticline portion of the Arbuckle-Simpson Aquifer, 80 percent is returned to the atmosphere through evapotranspiration. This fraction is critical to the well-being of the plant biota but does not represent a usable resource for development or other human surface water activities. 8% of the rainfall becomes direct runoff to streams and rivers in the area, and this fraction can best be described as storm surge or the increase in flow following rainfall events. The remaining 12% infiltrates and becomes ground water and eventually is discharged to surface water. This fraction represents the long-term stable flow observed between rainfall events. This is the majority of water in the regions streams and rivers, and controls not only the native (or base) flow but also the native water quality parameters. We have only to look to the far northeast corner of the State to see significant impact to surface water quality from ground water input in the Tarr Creek Superfund Site. Thus for a system such as the Arbuckle-Simpson, accurately defining the regions hydrologic budget must include both ground water

and surface water components and recognize the interchangeable nature of each.

Hydrologists, and biologists have recognized the interconnectedness of surface water and ground water for many years. Stream hydrograph patterns have long been used to evaluate the relative contributions of overland flow and baseflow (ground water) in watersheds, and bank storage-bank filtration wells have been used as a source of water since ancient times. Biologists have recognized the importance of the ground water surface water contact zone (the hyporheic zone) to river ecosystems. This interfacial zone may be more abundant in living creatures than the river above it, and can play a critical role in food chains and overall ecosystem health.

It is clear both surface water and ground water are critical for human consumption and watershed/ ecosystem function. However we regulate and manage these resources separately. Oklahoma uses a combination of Prior Appropriation and Riparian Doctrines to allocate, and regulate, water use from ground and surface water sources.
Although narrowly focused on the Arbuckle-Simpson Aquifer, the recently enacted Senate Bill 288 is the first legal precedence in Oklahoma law linking these resources. This legislation, if it stands, may not significantly clarify the future status of ground water-surface water interactions. Many issues will need to evolve into rules and regulations such as, what is a significant impact, how will evaluations be conducted and what the procedures for redress and appeal will be.

We may learn from the results of the implementation of programs in other States, which have attempted to deal with ground water-surface water interactions. Arizona has a highly regarded program based on the 1980 Ground water Management Act, which incorporates the concepts of beneficial use and safe (sustainable) yield. However the people of Oklahoma may not agree with the "population before agriculture" priorities of Arizona, and the hydrogeologic conditions of Oklahoma, (gaining surface water vs. the losing

systems predominant in Arizona) will alter needs and management approaches. It does seem clear that the"“Absolute Ownership” approach in use in Texas is not compatible with sustainable development, and leads to significant problems as resources become stressed. Currently federal regulations focused on wildlife, habitat and water quality appear to be expanding their coverage to encompass ground water-surface water interactions. This may have significant future ramifications to Oklahoma. Many States also appear to be moving toward a recognition of the role of GW-SW interactions which economically impact surface water bodies used for recreational purposes, and for the goods and services associated with ecosystems.

Since ground-water surface water interactions are important considerations for both water quality and water quantity, we need to incorporate both their recognition and evaluation methods into sustainable development planning. To evaluate the informational needs for incorporating ground water-surface water interactions into sustainable development planning we can use the four foundation areas outlined in the Smart Growth approach.

From the Social Component, the people of Oklahoma and their decision makers need to be informed about the linkages between ground water and surface water. As a part of the evolution of the social will for water resource management, the priorities for water use and ground water mining issues will need to be determined.

In the Economic Component, compensation for landowners, if current (ground) water rights are limited, will need to be determined. Oklahoma will also need to evaluate the relative economic benefits of public and commercial development vs. ecosystem good and services, in situations where hydrologic budgets make these outcomes incompatible.

With regard to Institutional Component, it is clear that the current structures of Oklahoma water resource laws, and perhaps the current regulation of water quantity and quality in many different state agencies, is incompatible with the reality of the interconnectedness of all the components of the hydrologic cycle.

The Environmental Component contains many of our informational needs. How do we quantitatively evaluate the impact of changes in water quantity or quality on ecosystem health and function, regardless of the source of the water? As previously noted, we now recognize the importance of hyporheic zones to many rivers and streams, but few systems in Oklahoma have been studied. We suspect that the ground water-surface water interfacial zones of Oklahoma’s large reservoirs also play a key role in surface water quality, particularly in regard to the attenuation of agrichemicals and nutrients, but this area needs further study.

In summary the scientific community has recognized the interconnectedness of ground water and surface water. Oklahoma’s social, legal and economic recognition of these interactions is still developing. However it is increasingly clear that these interactions will be a key consideration in the development of plans and policies to support sustainable development and protect the quality of life in Oklahoma.

Human Behavior and a Culture of Compliance

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The State of Oklahoma can immediately pursue several practical strategies for improving environmental compliance. These strategies should build upon the accumulated experience and expertise in compliance. Creating a "culture" of compliance with laws and regulations, regarding the environmental or any other policy area, has long been a topic of concern, vast effort, and the subject of innumerable studies. Rare is the company that remains ignorant of compliance methods.

Such efforts have paid off: it is widely recognized that modifying the dominant ways of corporate decision-making, its "culture," to enhance pro-active and voluntary compliance can dramatically reduce legal violations. Compliance studies have, for the most part, focused on operations internal to a corporation or organization.

Indeed, even a cursory survey of the vast literature shows how compliance aims at instilling into the culture of a company strategies for strengthening internal procedures for improving the moral and legal conduct of individual personnel. This internal focus is neither surprising nor misguided, but perhaps incomplete. What about compliance as a public policy issue, that considers the external relationships of corporations to the wider community and the state? Can the establishment of a culture of compliance be a practical state-wide goal? The benefits to the State of Oklahoma of having a more compliant business community would be enormous.

Creating Compliance

The possibility, and pragmatic usefulness, of external compliance is indicated by the same compliance literature already mentioned. The primary problem addressed by this literature is how to motivate corporations to develop a sound culture of compliance. Obviously, in this capitalist society the prime motivator of corporations towards compliance has been the threat of financial punishment, and the Organizational Sentencing Guidelines[1] have played the essential role in placing compliance high on the corporate world's agenda.

Yet the threat of financial punishment by itself is neither the best solution of the problem of compliance (as recurrent scandals depressingly show), nor is it the only way to establish a culture of compliance. This is easily demonstrated by considering how the threat of monetary punishment is hardly the unique, or even very important, method of motivating individuals towards compliance.

Do corporate managers and officers fear financial suffering or loss of employment *after* they are caught? Of course. But the tested and established methods of *pro-active* and *preventative* corporate compliance recommend a wide variety of other techniques.[2] If this conclusion has proven to be right about compliance inside a single corporation, it is probably also useful for creating compliance across a state.

A pragmatic approach to testing this possibility would survey the many ways that have proven helpful for improving internal compliance, and hypothesize about applying them at the higher external level. Besides the threat of financial and/or legal punishment if caught, four important corporate techniques are selected here:

1. Inform all relevant personnel about the expected standards and explain how to meet them, and make people feel *respected* as intelligent employees.

2. Instill a cultural ethic that values compliance for its own sake, and make people feel *valuable* for improving compliance.

3. Open a communication channel that encourages early reporting of potential problems, and make people feel *safe* about sharing information about their own or others' behavior.

4. Enforce all standards and regulations with appropriate measures and fair punishments, and make people feel *confident* about management's commitment and integrity.

Individuals usually need more than just a paycheck, but also need to feel respected, valuable, safe, and confident in their relationship with the corporation. A culture of non-compliance can easily emerge from conditions where people feel uninformed, unimportant, fearful, and distrustful about their corporation's compliance intentions. How can a state-wide culture of compliance be created? Corporations already understand the threat of legal punishment — what more could be done? Consider replacing the word "people" in techniques 1–4 with "corporation," yielding ***four pragmatic principles of compliance public policy***:

5. Inform the relevant corporations about the expected legal standards of their industry and explain how to meet them. Make corporations feel *respected* as intelligent businesses.

6. Instill a cultural ethic that values business compliance for its own sake. Make corporations feel *valuable* for improving compliance with state laws and regulations.

7. Open a communication channel that encourages early reporting of potential problems. Make corporations feel *safe* about sharing information about their own conduct, and the conduct of other business.

8. Enforce all standards and regulations with appropriate measures and fair punishments. Make corporations feel *confident* about the state's commitment to justice.

These four pragmatic principles are based on the supposition that corporations really do care about feeling respected, valuable, safe, and confident members of the community. Perhaps some businesses care only about "the bottom line," and thus only about their risk of legal punishment where compliance is concerned.

But most businesses believe that their wider social relationships and public reputation must be taken into account, either because they understand how these relationships can benefit corporate goals, or because they additionally believe that they have an obligation to make profits without seriously damaging those relationships. In any case, the attitudes that businesses take toward compliance are not developed in a non-ethical vacuum isolated from the surrounding social values and public policy climate; just as individuals within a corporation do not decide whether to care for compliance solely upon whether it directly affects their paycheck.

The myth that business cares only for profit and not ethics is just as fanciful as the wish that business would always prioritize the best interests of society and the environment. Reality is somewhere in between, and pragmatic public policy can have a large practical impact on corporate conduct.

This pragmatic approach suggests that state climate and public perception can have large effect upon whether a business will voluntarily and proactively seek compliance. The compliance climate can be adjusted within a state just like within a corporation[3], using techniques 5–8 and similar methods. The close parallels between internal and external compliance empower the state to accomplish compliance in an additional way. From the perspective of company employees, already familiar with internal compliance at work, the state's pursuit

of external compliance would make good sense if pursued in the same way. No employee could admire his or her state if it pursues compliance in any manner contradictory to how his or her company pursues compliance.

Furthermore, keeping in mind that such employees are state citizens, any state which pursued these pragmatic principles of compliance public policy would earn their respect and support, giving crucial public support for needed political changes.

Recommendations

The state-wide culture of compliance should match the established corporate culture of compliance in its best forms. Progress towards the four pragmatic principles of *compliance public policy* concerning the environment can be made in the short term through these recommendations:

#1. Review state efforts to ensure that the business community is aware of the expected legal standards of their industry and the ways to fully comply. Where necessary, establish new programs to provide this information to critical industries that serious impact the environment.

#2. Publicize and applaud the efforts of both the state and businesses to establish voluntary and pro-active compliance. Highlight "good citizens" of the business community for environmental compliance success.

#3. Explore possible means for encouraging early reporting of potential compliance problems. Highlight any existing state sentencing guidelines that can reduce penalties where a business reports its conduct.

#4. Examine current statutes and recent prosecutions to ensure that the state has pursued corporate offenders with fairness and impartiality. Place environmental compliance among the top goals of state political leadership by stressing both the successful prosecutions of corporate failures and the corporate success stories.

NOTES

1. The Organizational Sentencing Guidelines of the U.S. Sentencing Commission were again revised in 2004; see http://www.ussc.gov/orgguide.htm

2. As just a sample of some industries, see the following. Finance: "Compliance: A gap in the heart of risk management," (July 2003) by PricewaterhouseCoopers at www.pwcglobal.com/extweb/ncpressrelease.nsf/DocID DA0EFE566647CBD9CA256D66000A3CF4 Medicine: "Ethics/Corporate Compliance," by the Alliance of Community Hospices (2004) at www.hospices.org/ethics_compliance.htm. Energy: "Code of Business Conduct and Action" by Dynegy Corp. (2004) at www.dynegy.com/downloads/Dynegy_Code_of_Business_Conduct_and_Ethics.pdf

3. Some examples of exploring ways of creating a social climate of compliance that illustrate: Environmental Law: "Developing a Culture of Industrial Environmental Compliance" by the World Bank Development Forum (2002) at www.worldbank.org/devforum/files/compliance.doc. Labor: Fair Labor Association's First Public Report, "Towards Improving Workers' Lives" (2002) at www.fairlabor.org/all/transparency/charts_2002/Public%20Report%20Y1.pdf Education: "Proactive Compliance Site Visits" by the National Institutes of Health (2002) at http://grants.nih.gov/grants/compliance/compendium_2002.htm

environment

Hydrogen and Automobiles

Stan Ovshinsky, National Public Radio, April 27, 2004
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HOST
Automakers are increasing their investments in cars that can run on either gasoline or electricity. And they're also spending hundreds of millions of dollars to advance hydrogen cars that don't emit tailpipe pollution. But industry analysts say those are at least two decades away from commercial viability, an estimate that irritates Stan Ovshinsky. The 81-year-old Detroit entrepreneur wants to prove that his company's technology could shave years off such projections. NPR's Allison Aubrey reports.

REPORTER
All of the 274 patents that Stan Ovshinsky has to his name have something to do with improving energy conversion. To demonstrate his latest innovation, he climbs in behind the wheel of a standard four-door sedan that he's redesigned to run on hydrogen and quickly accelerates to 74 miles per hour.

Mr. STAN OVSHINSKY (Entrepreneur): So watch this.

REPORTER: Oh, God!

(Soundbite of acceleration)

REPORTER: Whoa, Stan, that's fast!

Mr. OVSHINSKY: Yeah, but we can make it even better.

REPORTER: Ovshinsky's wife and business partner of 50 years, Iris, sits in the passenger seat. Does that make you nervous?

Mrs. IRIS OVSHINSKY (Stan's Wife): Yes, it does.

REPORTER: But it doesn't surprise her. She says her husband is not capable of slowing down. He's not trying to sell the car, but the hydrogen fuel system it runs on. Ovshinsky first set his sights on the hydrogen economy 40 years ago when few people could conceive what it meant. He's long viewed hydrogen as the antidote to fossil fuel pollution and wars over oil. And now at 81, he's got a sense of urgency.

Mr. OVSHINSKY: All I do is shift it, and it exactly drives like, acts like any other car that's driven by gasoline.

REPORTER: Lots of competitors are developing hydrogen technology, but Ovshinsky is taking a different, pragmatic tack. Ovshinsky's car is not running on a f uel cell, a technology that would replace the combustion engine. In this case, he's just retooled the engine so that it runs off solid hydrogen, or hydride. He figures this may be less of a threat to automakers.

Mr. OVSHINSKY: One of the big oil companies said hydrogen is a possibility in 50 years. We've shown with our work that you're in the hydrogen economy now. You're driving it. Watch.

REPORTER: It's impossible to put a price tag on what Ovshinsky is demonstrating. Hydrogen vehicle prototypes cost hundreds of thousands of dollars. But Ovshinsky's optimistic. Selling ideas seems to come naturally to him, as does his command of science. The son of an Ohio scrap dealer, Ovshinsky skipped college, but his office walls in Rochester Hills, Michigan, are covered with framed honorary degrees and scientific awards. His biggest claim to fame is that his name appears in the dictionary, crediting him with the creation of a b! ranch of material science called Ovonics after Ovshinsky. In recent years, he's used his smarts to patent components of a solid hydrogen storage system that could be used to fuel both refitted combustion engines like the one he's just demonstrated or fuel cell powered cars.

Mr. OVSHINSKY: The way to look at us is we're unplugging from fossil fuels, which has been around a couple of million years, and plugging into the particles of the universe. The basic part of the hydrogen was born in the big bang, as I said. It makes up most of matter.

REPORTER: Ovshinsky imagines drivers refueling at hydrogen pumps which for the time being could be placed next to gas pumps at service station. But there is, of course, a catch. Vijay Vaitheeswaran is author of "Power to the People," a book about innovations and energy.

Mr. VIJAY VAITHEESWARAN ("Power to the People"): You can't just drive up to your Exxon or BP station and get hydrogen today or there's no convenie! nt place for consumers to get this. There's not that distribution sys tem.

REPORTER: But as Ovshinsky makes the rounds at his company's hydrogen technology lab, he says this problem is easier to solve than most imagined. He points to what he calls a simple solution.

Mr. OVSHINSKY: Here's a hydrogen tank that has hydrogen.

REPORTER: Solid hydrogen, which Ovshinsky says is easier to store and move. He says these tanks which hold the hydrogen can be shipped on barges, trucks, tankers just as crude oil and liquid gas are moved now. But convincing the world that his system of stolid hydrogen storage is the best approach for commercialization will be tough. For now, Ovshinsky has the resources to keep trying. He struck a partnership with ChevronTexaco which has promised 200 million in investment dollars. Vijay Vaitheeswaran says Ovshinsky's competitors are watching him closely.

Mr. VAITHEESWARAN: He's a brilliant scientist and a pioneer who's proven more than once that he's been able to change the game, and in energy s! torage he's clearly someone that commends a lot of respect.

REPORTER: The caveat says Vaitheeswaran is that Ovshinsky's is not the only approach. Some are pushing for compressed gas delivery of hydrogen. Others are betting on nanotubes. In these early days, carmakers and the governments that are subsidizing the development of hydrogen technology want to give all competitors a chance, but in the end, it's practical to have only one system of delivery.

Mr. VAITHEESWARAN: It might be solid storage which he's working on but so are 10 other companies. So almost certainly Ovshinsky's making progress and might be part of the solution, but he won't be alone.

REPORTER: Some investors in Ovshinsky's company, which is named ECD for Energy Conversion Devices, are getting restless. In the four decades the company's been publicly traded, it's only had four profitable years, a fact that Ovshinsky's not eager to publicize, but when asked, he says there's a simple ex! planation.

Mr. OVSHINSKY: Some people read about our large los ses. Those losses are investments. They're not losses that we made by inefficient manufacturing or organization. They're what we have chosen very ambitiously to do.

REPORTER: The defensiveness fades away as Ovshinsky pulls his hydrogen car back into his warehouse-sized laboratory. Inside, a framed poster-sized photo hangs on the wall. It's a picture of a barefoot Mexican woman climbing a hillside in Chiapas. On her back, she has a portable solar energy kit, a kit built from Ovshinsky's earlier solar patents, and on the woman's front, she carries an infant.

Mr. OVSHINSKY: So on her back is the future. On the front is the future. That child that she's carrying in front of her is going to go to school. We know that 'cause we electrify schools. We see what a tremendous difference that makes.

REPORTER: That idea that the fruits of his labor can provide clean, cheap power to a rural village lights up his eyes, and for this scientist-inventor turned ent! repreneur, hydrogen is the final frontier.

Cleaning Up Oklahoma's Landscape

Robert J. Sullivan, Jr., Chairman, Oklahoma Energy Resources Board

Introduction

Relying entirely on the collaborative effort of Oklahoma's oil and natural gas producers and royalty owners, the Oklahoma Energy Resources Board (OERB) has made ten years of enormous strides toward healing scars on our state's land left behind decades ago by oil and gas operators during an unregulated era. Large amounts of privately owned land have been landscaped, beautified and returned to productive status. All of this has been funded by the voluntary contributions of oil and natural gas producers and royalty owners who allow one tenth of one percent of their oil and gas revenues to be contributed to OERB. Over its ten-year life, OERB has restored 5,600 abandoned well sites in 59 of Oklahoma's 77 counties. More than $22 million has been spent by OERB since inception. More important, however, is the effect on the thousands of individuals and families who have experienced restoration of their family heritage, and in many cases their livelihoods, as their lands have been cleaned up and brought back into productivity.

Beginning with an original list of 17 sites in 1993, OERB's activity is now proceeding at a pace of restoring three to four wellsites a day all across the state. The identification of cleanup sites was not always an easy task. In fact, in OERB's early months, the program met with skepticism from landowners because they simply could not believe their property was going to be restored at no cost to them. To overcome this understandable disbelief and to create genuine and accurate public awareness that the program existed and indeed would pay for cleaning up private prop-erty, the OERB began publicizing the testimonies of landowners affected by the program. One of the most recognized stories is told by Janice Scroggins of Morrison, Oklahoma.

Landowner Testimony

"I read in the abstract that the lease was purchased in 1915. When my daddy purchased the land in 1956, there were only a few oil wells still producing. There was a lot of pollution as well as concrete structures, oil sludge, salt water pits. I have a picture of my brother… oil barrels, old wire. The concrete structures were very large. My dad often thought about cleaning it up himself, but it cost entirely too much money.

One evening, we were watching the news. I heard this beautiful music, which got my attention, and it was this lady talking about her past. There was an oil field on her daddy's property and what an ugly mess it had left in their back yard. About that time, it was showing children running through the field and then she looked right at the camera and said, "I wished my daddy were here to see it." It brought tears to my eyes. I made the phone call to the OERB, and within a few days, they called me back. I could not believe someone was as interested in cleaning up my daddy's land as I was.

For me there wasn't any challenge in cleaning up the site. All I had to do was make that phone call, sign a few papers, cook a few meals for the crew. When OERB asked me for a right to entry, I had no doubts. It was not a legal concern to me whatsoever. They came in, they did their work, they left. I still had all my land, except this time it was cleaned up and beautiful and didn't have the ugly old sites there.

First feeling I have when I look at the land is gratitude to the OERB for helping us complete one of my daddy's dreams. If my daddy could see this land now, he would say, 'Sister, job well done. I am proud of you.'"

Landowner Research

Because Janice is just one of thousands of Oklahomans impacted by the environmental cleanup program, OERB recently conducted an impact study of landowners to determine their opinions of the program's effectiveness. An independent research firm, Wilson Research Strategies, conducted 300 telephone interviews with landowners where OERB had completed cleanup operations. The following outlines the questions that were asked and provides summary results of the research.

When asked to identify the most significant problems on their properties prior to restoration, respondents chose among multiple responses. They are below:

abandoned concrete 58%
erosion or salt water scars..... 38%
old equipment 33%
caked hydrocarbon-impacted soil 17%
sludge/slush pool/pits..... 8%

These conditions left the land unusable for 72% of surveyed landowners. Approximately 38%, when asked how they dealt with the problem areas before restoration, said "nothing, left it alone" while 24% replied "farmed around them" and 10% said "fenced them off." Only 27% who "grazed livestock on them" seemed to get any use out of the land before OERB's restoration.

Besides making the land virtually worthless, the surface problems left behind by years of neglect also caused health and safety concerns in the eyes of 69% of the respondents.

Given the land's condition prior to restoration, it is not surprising that many respondents believe the value of their land increased as a result of OERB's restoration, in addition to land becoming safer and more useful. Sixty-two percent believe the value of their property increased due to OERB's program.

Interestingly, when asked if more people than just the immediate landowners of a given property were affected by restoration, 90% agreed that indeed the broader populace has been positively affected. In short, OERB's program is not only helping landowners by cleaning up "the sins of the past", but in doing so is improving the lives of Oklahomans generally.

When asked "In your opinion, what is the greatest benefit of the OERB environmental restoration project?", the most popular responses were that it helps the community, makes the land safer, improves the value of the land, makes it more productive, and generally beautifies Oklahoma's landscape.

Conclusion and the Future

The research provided by Wilson proves that the voluntary contributions by Oklahoma's oil and natural gas producers and royalty owners are making a tremendous positive impact not only on landowners but on all Oklahoma citizens.

Although it is difficult to determine the exact number of abandoned wellsites that remain in Oklahoma for OERB's future restoration work, estimates by industry and government officials make it clear that the OERB has many years of work awaiting its very effective attention.

Further, OERB has been widely recognized nationally for its innovative work and has been held out as an example of how the private sector and industry can demonstrate responsible citizenship through voluntary cleanup of environmental problems.

In addition to being a good example for other states to emulate, OERB is anxious to serve as a catalyst for a possible national program within the energy industry to provide similar environmental restorative and education programs paid for by the industry.

OERB's ten years of successful operations for the benefit of Oklahomans may well turn out to be only the beginning of several decades of benefits for the state and our nation.

A Responsible Balance and the Nature Conservancy

Grant Gerondale, Director of Environmental Affairs, The Nature Conservancy of Oklahoma

Since 1951, The Nature Conservancy has worked with private land owners, the public, corporations, foundations, state & federal agencies, and international governments to conserve portions of the Earth's remaining biologically significant areas. Those efforts have produced the world's largest private collection of nature preserves. While that accomplishment has set the Conservancy apart from other conservation NGO's, the continuing pressures placed on the natural world by humans demands that the Conservancy advocate new, solution-based approaches to achieve conservation through our steadfast stewardship commitments, and more recently, through pursuing responsible conservation practices and policies.

For this year's Oklahoma Academy, the term "responsible balance" or "smart growth" are close cousins to our concept of "ecological sustainability". Ecological sustainability is not about sustained economic growth. Nor does it imply a "hands-off" approach to conservation... fencing off preserves and maintaining all natural resources in a pristine condition.

Rather, ecological sustainability means making wise choices for human uses of our natural resources for economic benefit, in such a way that natural ecosystems remain relatively healthy, intact or with sustained plant and animal populations living within them. Ecological sustainability suggests that there are limits to our management options of natural resources before the goods and services provided by these resources are degraded. Managed unwisely, healthy landscapes, rivers and streams can experience a loss in commercial productivity, natural biodiversity, ecotourism, water quality and aesthetics. The resulting loss in the quality of life for all Oklahomans is a legacy no one wishes to leave behind.

Recently, The Nature Conservancy has focused on raising awareness of, and developing tools for humans as we strive to achieve an ecological balance with our planet. Concepts for ecologically sustainable management practices now dominate much of the Conservancy's efforts. Today we're advocating new ideas and methods designed to strike a balance between the natural health of our landscapes and aquatic environments with the humans that depend on them. Models such as the Conservancy's Ecologically Sustainable Water Management, The Forest Bank, Marine Initiative, Sustainable Forest Initiative, Fire Initiative and grassland banking programs are working examples of how the Conservancy is striving across the planet to provide workable solutions in today's world.

The Nature Conservancy
SAVING THE LAST GREAT PLACES ON EARTH

The Oklahoma Chapter of The Nature Conservancy is working hard to advocate ecological sustainability in several areas including:

- ***Ecologically Sustainable Water Management***
- ***Sustainable Rangeland Management***
- ***Invasive Species Initiative***
- ***Sustainable Forestry***

Some highlights of each follow:

Ecologically Sustainable Water Management
Healthy freshwater ecosystems provide free and valuable natural services for all of us. Healthy rivers purify our water, moderate floods and

droughts, move nutrients into and out of our watersheds, and help maintain essential habitat for fisheries, birds and other wildlife. Since statehood, Oklahoma's river systems have provided these services for free. In the 1900's, numerous dams and water diversions have modified our rivers to provide goods and services such as hydroelectric power, ecotourism, expanded irrigation and increased flood retention capacity, to name a few.

Today however, our state is left with a handful of relatively intact natural streams and rivers that try to perform their evolutionary roles as rivers as they've done for eons. Special places like the Glover and Kiamichi Rivers in southeast Oklahoma still hold their native fish populations, and are spectacular examples of aquatic richness. With predictions of a growing Oklahoma population, our state is looking for convenient methods to secure drinking water for Oklahoma's future population needs.

In pursuing a responsible environmental approach to water management in Oklahoma, the Conservancy is advocating our Ecologically Sustainable Water Management (ESWM) model with water managers. Our ESWM model offers Oklahoma water managers a scientific approach that can determine the river flow needs for nature AND humans. The Conservancy believes there is room to achieve balanced management for both through a method of careful planning, research and monitoring...while being prepared to manage adaptively to changing climate, river and human conditions.

The challenge to careful water management planning in Oklahoma is to better understand how our rivers function, and then craft an adaptive management plan around the natural flow variability of rivers. It may be possible to meet some or even most of humans demand for water from these streams, but a responsible (and sustainable) approach dictates that there will be limits to the amount of tampering that can be done to Oklahoma's dynamic rivers and the flows they need to remain healthy.

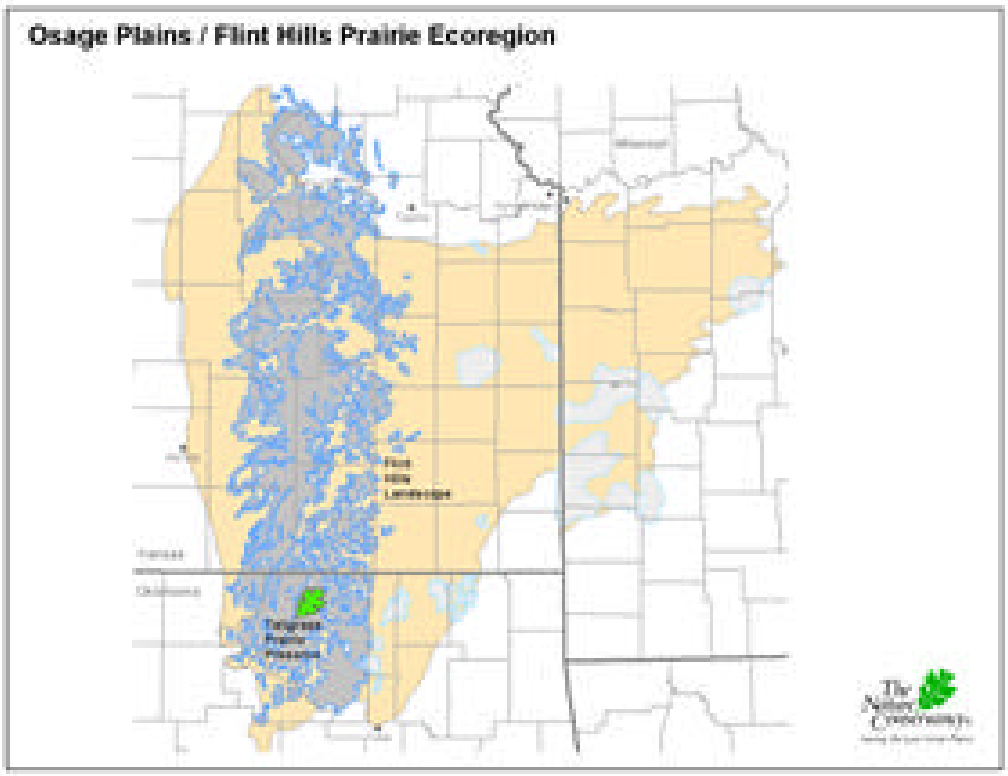
Further research is needed to establish natural flow prescriptions for low-flow, mid-flow, and high-flow years for these ecologically significant rivers to better understand how they function over time. Defining the natural flow variables of these important streams is a critical first step for our state agencies to complete in pursing such a balanced approach to water management. The Conservancy will continue to work with Oklahoma leaders toward recognizing and accomplishing this goal.

Sustainable Rangeland Management

Much of Oklahoma's natural heritage can be found in our rangelands. Large, untilled landscapes provide essential habitat for Oklahoma's ground nesting birds. Meadowlarks, prairie chickens, quail, pheasant, dickcissels and our state bird, the scissor-tail flycatcher, depend on healthy grasslands to survive. Managing for these species can present problems for cattle producers trying to maintain their family business and traditions. The Conservancy is exploring a responsible approach that may offer ranchers and wildlife a chance to co-exist, with a profit for both.

The Conservancy is researching a sustainable approach to rangeland management in the Osage Plains/Flint Hills areas of Oklahoma and Kansas, where cultural ranching practices include burning a majority of rangelands each spring. This approach can unintentionally damage critical habitat for ground nesting bird life cycles.

Our "Patch Burn" approach utilizes prescribed burning on roughly 1/3rd of productive rangeland, leaving the remaining portions undisturbed by fire. Early research by Oklahoma State University (see following article "Restoring the Tall Grass Prairie", Samuel D. Fuhlendorf and David M. Engle, Rangeland Ecology and Management, Department of Plant and Soil Sciences, Oklahoma State University) indicates that the complex and mosaic plant communities produced by this "patchy" approach offers huge rewards for biodiversity... and a potential profit for cow-calf producers.



Measurements of cattle weight gains produced by grazing this "patchy" landscape, reduced nutrient supplements for cows and lower rangeland input costs for ranchers are showing promise for this responsible approach to sustaining essential Oklahoma rangelands for some ranch operators, and the threatened wildlife that still remain there. The Conservancy has, and will continue to advocate this potentially useful management model with Oklahoma ranchers and rangeland policy makers.

Invasive Species Initiative

Perhaps the greatest threat to the productivity of Oklahoma's native landscapes and wildlife is the spread of eastern red cedar. Driving westward across Oklahoma, it doesn't take long to notice the overpopulation of cedar saplings dotting our wide-open rangelands. In some cases, evidence of cedar infestation has left complete eastern red cedar forests. The Natural Resources Conservation Service recently concluded that since 1950, red cedars have spread 79% across our state - from 1.5 million acres to more than 6 million acres of rangeland and forestland. A recent estimate for the year 2000 claimed nearly 9 million acres of Oklahoma will have been covered with this invasive juniper.

This exponential trend is consuming more than 760 acres of Oklahoma every day, and the effect is disastrous.

Without the restraint of fire, red cedar invasions create a forest canopy which out-competes native vegetation. The resulting bare soils and increased erosion severely impacts native plant and animal communities and escalates soil erosion. Red cedar's extensive root system has also been labeled "water wasters" by experts and could potentially reduce the recharge capacity of Oklahoma's water aquifers as well.

To sustain the health and productivity of Oklahoma's rangeland, the Conservancy suggests a combination of prescribed burning and mechanical removal of this killer threat to

Oklahoma's lands. How this gets accomplished is a difficult matter for our state policy makers to determine.

Attempts by the Eastern Red Cedar Task Force originally set up by Gov. Keating completed an exhaustive analysis of the problems of cedar infestation. The Conservancy participated in this focused effort and agrees with many recommendations produced by this diverse group of Oklahomans. Some of the recommendations include:

- Modifying Oklahoma's prescribed burn laws to encourage the use of prescribed burn practices on rangelands. Many landowners are not comfortable with the current liability status placed on them by state law, and so they avoid using this efficient and cost-effective rangeland management tool.

- Educating land owners and managers about the problems associated with Eastern Red Cedar infestation.

- Many Oklahomans have adopted the "all trees are good" mindset, which may have lead to the acceptance of cedars in areas where they should not naturally occur.

The Conservancy is aware that overgrazing may also contribute toward the Eastern Red Cedar control factor as well. In some cases, ranchers may carry higher-than-desirable cattle stocking rates on their land. The shortly grazed rangeland grass is then not capable of facilitating a "high intensity" burn that can successfully control Eastern Red Cedars. Perhaps options can be explored to improve best management practices or incentives to avoid the potential for ranchers to overgraze their rangelands.

Sustainable Forestry

The Conservancy is just beginning to advocate the practice of sustainable forestry in our state. There are vast acreages of forest in the Ouachita Mountains that have been placed into timber production since statehood. The challenge is to determine a responsible forest management approach that balances wildlife, plants, soils, air and water quality needs with the needs of the forest industry.

Maintaining soil productivity, and protecting forests from undesirable wildfire, pests and diseases to sustain long-term forest health are cornerstone principles of the Conservancy's Sustainable Forest Initiative. Protecting watershed health and sustaining biological diversity are key challenges to us all as society decides how to best steward Oklahoma's last remaining healthy forests.

Summary

The Nature Conservancy encourages all Oklahomans to embrace the concept of ecologically sustainable practices with regard to these important conservation issues in our state. Such practices don't happen overnight, nor will they come without making difficult choices.

Only through the joint efforts of many stakeholders, including Oklahoma's leaders, landowners, corporations and the larger population will we be able to achieve lasting conservation to benefit our state's most precious natural environment. It's a commitment that needs to be made today, with a long-range perspective of where we as a state hope to be in the decades ahead.

Restoring the Tall Grass Prairie

Samuel D. Fuhlendorf and David M. Engle, Rangeland Ecology and Management
Department of Plant and Soil Sciences, Oklahoma State University

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A model of the grazing-fire interaction argues that grazing and fire interact through a series of positive and negative feedbacks to cause a shifting mosaic of vegetation pattern across the landscape. This interaction was important to the evolution of species in the grasslands of the North American Great Plains.

The grazing-fire interaction is proposed as a potential model for ecologically based management of those grasslands with a long evolutionary history of grazing. This contrasts to traditional management of native grasslands, which has long operated under the paradigm of minimizing spatially discrete disturbances often under the objective of reducing inherent heterogeneity within managed ecosystems.

Uniform distribution of disturbance so that no areas are either heavily disturbed or undisturbed (i.e., management toward the middle) has been the goal of much of modern grazing and prescribed fire practices. We are comparing a heterogeneity-based approach with fire applied to discrete patches (patch burning) to traditional homogeneity-based management. In this comparison, we are evaluating the management systems in terms of achieving objectives associated with biodiversity, wildlife habitat, livestock performance, and control of invasive species.

Our data indicate livestock devote most of their grazing time within patches that burned within the past year. These focal disturbances cause local changes in the plant community and increased heterogeneity across landscapes. As the focal disturbance is shifted to other patches over time, successional processes lead to changes in local plant communities so that the resulting patchwork landscape can be described as a shifting mosaic.

Some species of wildlife respond favorably to the increased heterogeneity across the landscape, and livestock performance is not reduced. Moreover, patch burning displays the potential to control invasive species including a species that is fire intolerant and a species that is fire tolerant.

Our study demonstrates that the fire-grazing interaction model may be a useful heterogeneity-based model for grassland management in which discrete fires are applied to patches and selective grazing by cattle promotes a shifting mosaic across the landscape.

Furthermore, application of the model has the potential of increasing the area of grasslands under management for conservation purposes because livestock production is maintained at a level similar to traditional management.

The fire-grazing interaction model may also have value for managing grassland fuels and for reducing spread of wildfire across grassland landscapes.

Nature's True Value

Tom Libby, Chairman, Oklahoma Chapter, The Sierra Club

Our Environment

Those who spend time in nature have long promoted its restorative properties for the mind, body and spirit and claim that the natural world has intrinsic value that cannot be translated to dollars and cents. True enough. But there is also a case to be made to protect the environment for its economic value.

A 1997 study published in the scientific journal Nature suggested that there are "ecosystem services" flowing directly to society.

These""ecosystem services" range from soil formation and climate regulation to pollination and water supply.

Four Billion Years

They are a natural resource "savings account" that has built up over 3.8 billion years. If used in a sustainable and responsible manner and allowed to regenerate, Oklahoma can live off the""interest" of this""savings account" for generations. If not used in a sustainable and responsible manner, our "savings account" will be depleted and the ultimate cost will be passed to our children and grandchildren.

Under our current extraction based economy, the expense of impacting or destroying these ecological services and some natural resources is largely absent from the prices set in the marketplace. Consider the Rush Springs Watermelon.

Neither the farmer nor the grocer nor the consumer pays for the insects to pollinate the blossoms ultimately yielding the melon. But, if the insect population is seriously reduced or destroyed through the reduction of habitat or improper use of chemicals, then the watermelon crop will be drastically reduced. The consumer will then pay more for a watermelon because of demand for a scarce product. And, if the farmer comes up with artificial means of pollinating his crop, the result will be increased production costs that will be passed on to the grocer and ultimately the consumer. Either way, the consumer pays more. So the insects have an economic value that is not currently being recognized.

Wetlands are another example.

Wetlands serve as wildlife habitat, natural water filters, and sponges for flood waters. When these wetlands and floodplains are dredged and filled to make way for roads, homes and shopping centers, flooding increases and polluted runoff from urban and agricultural sources are channeled into the remaining waterways. The man-made systems necessary to replace the many functions of a single wetland would include flood control dams, water treatment systems, and more. All at an increased burden to tax payers to compensate for the natural systems that were destroyed.

And we can never bring under direct human management all the facets that make up an ecosystem like a wetland. Wetlands are another ecological resource that has an economic value that is not currently being recognized.

Not recognizing the economic value of ecological systems until they are depleted prevents a sustainable economy from emerging and is at the root of a pending ecologic and economic crisis.

Perhaps the primary source of our problems is that we don't know how to value nature in our economic accounting systems. We count as "capital" the wealth created from the consumer goods produced and the money earned from selling them. And by the time we have begun to appreciate the value of some component of the

natural world or account for it in the marketplace, an ecological freefall has already commenced.

At that point, attempts to place higher values on the resource are often insufficient to reverse the trend or compensate for the loss.

Much of our economic growth since statehood has been gained by "drawing down" our store of natural capital or at the very least, not recognizing the value of our natural resources. We have been funding our current economy on natural resource stores necessary for the well being of future generations. In essence we have been spending our children's inheritance. Growth based on resource consumption cannot continue indefinitely. We cannot go beyond 100% consumption of our resources.

The sale of water is one such example.

The pressures on our water supply are enormous and growing. With rainfall as the source, there is no more fresh water now than two thousand years ago. Growing populations mean a continually shrinking amount of water available per person. Our current extraction based economy leads us to deplete existing water supplies in return for short-term economic gains.

Current patterns of use are not sustainable and have resulted in our using water faster than it can be replenished, essentially "overdrawing" our water account.

For example, the water level in the massive Ogallala Aquifer, stretching hundreds of miles from Texas through Western Oklahoma to South Dakota declined an average of 16.8 inches per year from 1969 to 1979, 9.8 inches per year from 1979-1989, and 6.6 inches per year from 1989-1999. According to computer projections done by the Texas Water Development Board, by 2020 the Ogallala may lose almost two-thirds of its 1974 volume.

As a result, the Beaver River in far Northwestern Oklahoma is now a dry riverbed and will probably never run again in our lifetimes, if ever. Without a sustainable plan for using Oklahoma's water resources, future generations might find themselves inheriting even more dry riverbeds.

In the absence of an economic system that recognizes the value of Oklahoma's natural resources, it will be necessary to develop public policies to guarantee the sustainability of Oklahoma's ecosystem services for the benefit of future generations. In the case of water, such policies would recognize water as a public resource not a commodity and ensure the sustainability of safe water supplies for the benefit of all people and the environment.

Furthermore it would address the intimate interconnections between surface water and groundwater replace the concept of depletion schedules with sustainable usage rates protect ALL beneficial uses provide a new definition of excess water that guarantees minimum water reserves to meet all present and future beneficial uses, guarantees minimum in stream flows preserves water quality
provides for future generations

Similar planning should be done for all of Oklahoma's natural capital and associated "ecological services". By planning in this way, and recognizing the true value of nature, we can ensure a vibrant, sustainable economy for future generations of Oklahomans.

Save The Illinois River

Ed Brocksmith, Secretary-Treasurer, Save the Illinois River, Inc.

Save the Illinois River, Inc., STIR, is the only private, not-for-profit organization chartered exclusively for the preservation of the Illinois River, Flint Creek, Barren Fork Creek, Tenkiller Lake, and their tributaries. It is the voice of Oklahoma Scenic Rivers.

Tahlequah area citizens formed STIR in the early 1980's in response to a permit allowing Fayetteville, Arkansas to discharge treated sewage into the Illinois River Basin.

Represented by former U.S. Representative, the late Ed Edmondson of Muskogee, STIR joined the State of Oklahoma in appealing the EPA's decision to the United States Tenth Circuit Court of Appeals. After winning that appeal, the U.S. Supreme Court made a precedent-setting ruling in the Fayetteville case. The high court held that under the Federal Clean Water Act, "upstream states must meet the water quality standards of downstream states". The decision is being used today throughout the nation as states attempt to address pollution of their shared waters.

Armed with this decision, Oklahoma water quality regulators have adopted more stringent standards and concentrated water-sampling programs for the Lake Tenkiller, the Illinois River, and other Oklahoma Scenic Rivers. This will help insure their futures.

STIR was instrumental in the adoption of an instream numeric limit for phosphorus for Oklahoma Scenic Rivers, probably the most important protection for Oklahoma Scenic Rivers since adoption of the Oklahoma Scenic Rivers Act. STIR members helped generate more than 600 supportive comments submitted to the Oklahoma Water Resources Board, helping insure adoption of the historic phosphorus standard. No previous issue prompted such a favorable response to an Oklahoma Water Resources Board rule. Following state adoption of the standard, STIR led the campaign to get EPA approval of the phosphorus rule.

Working with the Greater Tenkiller Area Association, STIR successfully campaigned for a High Quality Water designation for Lake Tenkiller. Governor Brad Henry approved the OWRB's HQW designation for Tenkiller Lake. The HQW designation, paired with the very high standards for the Illinois River, will help insure future protection of Lake Tenkiller.

STIR played a major part in the adoption by the Oklahoma Scenic Rivers Commission of the Illinois River Management Plan. The plan is a blue print for managing the growth in the Illinois River basin.

STIR formally successfully blocked a proposal, which would have brought raw sewage to the upper Illinois River for treatment at the Watts, Oklahoma sewage lagoon. Working closely with the Oklahoma Scenic Rivers Commission and the Oklahoma Attorney General's Office, STIR helped achieve an environmentally safe alternative to the controversial plan.

STIR was a party to a Federal Court lawsuit over the EPA's failure to exercise oversight of Total Maximum Daily Load (TMDL) pollutant limits for the Illinois River and continues to press for adoption of TMDLs for the Illinois River and other impaired streams.

Illinois River: Deal Leaves Tulsa Developer Facing Fine

Rod Walton, The Tulsa World, May 16, 2004

TAHLEQUAH — The Oklahoma Scenic Rivers Commission voted Tuesday to accept a deal requiring a Tulsa developer to cover $75,000 in fines for getting caught doing nonpermitted dirt work and construction along the Illinois River earlier this year.

Only two months ago, state officials thought they might have to take Hoby Ferrell to court because his company dug up vegetation, gravel and dirt along the river banks. Now, Ferrell will pay $25,000 in cash fines and do $50,000 worth of work to right his environmental wrongs along the waterway.

"Mr. Ferrell has come full circle and said he wants to accept full responsibility," Scenic Rivers Commission Administrator Ed Fite said. "It's unprecedented to take only 60 days to work this out.

"Generally, these things are drawn out over a year or two." Ferrell's company, Greater Tulsa Investments, planned to build cabins along the Illinois River about 25 miles north of Tahlequah. In fact, he already had hired out dirt work that was being done without seek ing state and federal permits, according to reports.

An anonymous tip got federal and state officials involved to stop the work, according to reports. The U.S. Army Corps of Engineers issued the stoppage order March 10. Ferrell, who had bought 60 acres with the idea of building cabins and a parklike area, said he did not know he was breaking the law.

"I didn't realize I needed a permit to clear brush on my own land," he said in April. Other officials said Ferrell's project pulled up trees and other plants that stopped erosion along the river. Witnesses told state officials that they saw bulldozers and backhoes actually in the Illinois River.

The Illinois is a popular recreation destination, luring hundred of thousands of visitors each year for swimming, canoeing and fishing. At their April 20 meeting, OSRC commissioners talked about getting a court injunction to stop any further work. Later, however, Ferrell came to an agreement with the Oklahoma Department of Environmental Quality, the lead agency for the negotiations.

The DEQ consent order will require Ferrell to pay $25,000 in cash fines — $15,000 to the DEQ and $10,000 to the OSRC. The remaining $50,000 of the fine will be paid out with repair work along the river's edge. Ferrell agreed to keep a 60-foot buffer between construction and the west bank. He also will not build anything at the north and south ends of his property, a buffer area of about 19 total acres.

Finally, Ferrell will remove the sloughs he built earlier this year. The dirt used to make the dams will be returned so the area will be a wetlands again, according to the consent order. Ferrell still plans to build cabins on his property. He will be allowed to do so once he receives the required permits.

"What we had the ability to do is say we will give you credit if you do these things," DEQ attorney Don Maisch said. "We will put him on a fairly accelerated program for doing that." The repair work could be completed by Dec. 1, according to the order.

Ferrell will be fined $100 per day for each offense if he doesn't do the repair work or pay the financial penalties due to the DEQ or the OSRC.

Fite predicted that Ferrell will not delay on his promises. "While Mr. Ferrell is a villain in some groups, he's been one of the most cooperative individuals I've seen," Fite said. "I've seen him take responsibility."

Working For Oklahoma's Economic & Environmental Future

James Barnett, President and General Counsel, The Environmental Federation of Oklahoma

The Oklahoma Academy 2004 Town Hall meeting theme of pursuing a responsible balance is virtually synonymous with the Environmental Federation of Oklahoma's (EFO) motto of "Working for Oklahoma's Economic and Environmental Future."

EFO works to (1) promote the development of sound environmental policies and legislation; (2) educate and inform EFO members, governmental officials and the citizens of Oklahoma as to environmental issues affecting commerce; and (3) address the common environmental concerns of EFO members.

The Environmental Federation of Oklahoma is a non-profit corporation founded in 1991 to provide industry with, among other benefits, a voice in the formation and implementation of environmental laws, regulations and policies. EFO's membership includes most of the major national and state companies doing business in Oklahoma whose activities entail environmental regulation and permitting.

EFO's goals are essentially threefold, all of which are educational.

> *First, educating the members – EFO strives to educate its membership through seminars, training sessions, legislative meetings, and annual meetings. EFO also provides members with a bi-monthly newsletter with information regarding a variety of environmental subjects.*
>
> *Second, educating the general public—EFO provides information to the public through EFO's web site,[1] technical seminars, informal gatherings, and news releases.*
>
> *Third, education of the decision makers – EFO informs executive and legislative branch decision makers of pertinent environmental issues through annual legislative receptions, maintaining a lobbying presence at all legislative sessions, personal contact with Oklahoma Department of Environmental Quality (ODEQ), Oklahoma Water Resources Board (OWRB), and other environmental agency management personnel, as well as the Governor, Attorney General, etc.*

In addition, EFO files amicus curiae (friend of the court) briefs in significant environmental lawsuits to provide the judicial branch with industry's view on environmental issues.

In summary, due to the fact that each year the number of environmental laws and regulations multiplies, it is virtually impossible for any one company to keep up with all the proposed and adopted changes. The unified voice of EFO has proven to be stronger and more effective than that of single companies. Through seminars, training sessions and legislative monitoring, EFO strives to explain the environmental enhancement programs undertaken by industry and provide up-to-date information regarding environmental events both in Oklahoma and across the country.

In addition to the efforts of EFO itself, virtually all of EFO's company members have adopted policies aimed at a responsible balance between economic growth and the environment. One of the primary tools they have used in seeking such a balance is

through a formal commitment to environmental sustainability. Five EFO members'– BP, General Motors, Georgia Pacific, Sunoco, and Weyerhaeuser – have committed to the Global Responsibility Initiative, a long-term, multiple stakeholder, international initiative. Background information and the current version of the Sustainability Reporting Guidelines may be found at–www.globalreporting.org.[2]

Other EFO company members which have indicated their commitment to environmental stewardship include Goodyear, Koch Industries, Holcim, Boeing, ConocoPhillips, Williams Companies, American Electric Power, OGE Energy, Valero Energy, LaFarge, AES, Kerr-McGee, Dayton Tire, Sinclair, Clean Harbors, ONEOK, Waste Management, and Western Farmers Electric Cooperative.

Similarly, EFO's Associate and Affiliate members support a responsible balance between environmental sustainability and economic development. There remains, however, a substantial question in some quarters as to whether making a commitment to sustainable development will actually have a positive economic effect on a company's bottom line.

PriceWaterhouseCoopers contacted 631 large U. S. based companies regarding sustainability during May and June, 2002, 140 of which responded. Twenty-five percent (25%) of the respondents stated that they have not adopted sustainable balance practices. [3] One might assume that an even higher percentage of those not responding to the survey would have a pessimistic view of the concept.

In any event, the principal reasons provided by those with negative responses were (1) no clear business case (82%), (2) lack of key stakeholder interest (62%), and (3) lack of senior management commitment (53%). It would appear that each of these reasons would dissipate if a sound economic rationale for sustainability could be articulated. However, absent such an economic rationale, there is no reason to think there will be any significant reduction in the current percentage of naysayers, at least in the near future. In fact, a number of small to medium-sized companies would be expected to share this negative view of sustainability inasmuch as it may be difficult for them to justify an expense item with no readily apparent offsetting revenue.

Thus the question becomes whether a company's commitment to sustainable development is simply a feel-good public relations activity or does it provide real financial benefit to the stockholders. Documenting that tangible benefits occur is the challenge advocates of sustainable development face. Failing to meet the challenge will undoubtedly result in the sustainable development movement stalling out well short of 100% participation.

On the other hand, if sustainable development advocates can provide convincing evidence that the concept makes good economic sense, sustainable development can become the norm for companies worldwide.

Achieving that goal would truly fulfill EFO's mission of ensuring that our state'"provides an environment conducive to a high quality of life for all Oklahomans through balanced, responsible economic growth and protection of our natural resources." [4]

End Notes

1 www.envirofdok.org

2 The Global Responsibility Initiative was established in 1997 by the Coalition for Environmentally Responsible Economics (CERES) in collaboration with the Tellus Institute. GRI is a non-profit foundation and an official collaborating center of the United Nations Environmental Programme (UNEP).

3 PriceWaterhouseCoopers, 2002 Sustainability Survey Report, August 2002, available in PDF format from PriceWaterhouseCoopers Environmental Advisory Services website at www.pwcglobal.com/eas

4 See EFO's mission statement at www.envirofdok.org

Us ... and Our Neighboring States

Diana Wilkins, Department of Environmental Quality (Oklahoma)

Pollution Prevention & Environmental Management Systems in EPA Region 6:

Tools for Enhancing the Environment, Organizational Efficiency & Profitability

Good business practice encourages efficiency. Therefore, pollution prevention efforts should be ingrained in facility operations. However, the need to satisfy regulatory requirements remains the primary driver behind pollution control and prevention efforts.

Cost savings and enhanced profits may be organizational goals, but meeting permit limits and evading unplanned releases are the battles that are fought daily.

This reactive approach — responding to statutory requirements — does not always guarantee practices that maximize organizational interests. Proactive organizations reduce waste costs and increase profit margins by effectively engaging their environmental knowledge.

Organizations that maximize efficiency, and simplify efficiency across operations, will emerge as winners. The challenge is to move pollution prevention programs into line with the rest of the organizational goals. Even so, regulatory compliance always provides the basis for environmental performance requirements.

The Region 6 states (Oklahoma, Texas, Arkansas, New Mexico and Louisiana) are all exploring ways to assist business and industry.

Oklahoma

The Pollution Prevention Program with the support of partners (the Oklahoma Small Business Development Centers; the Oklahoma Quality Award Foundation; Francis Tuttle Career Technology Center Business Industry Services) announces the establishment of two programs designed to demonstrate that organizations can profit from sound environmental performance.

The Environmental Performance and Recognition Program provides an integrated environmental management system tied to leadership, planning, information usage, employees, customers, suppliers, market requirements, performance and key business indicators. The Program will enhance competitiveness, shared learning, continuous improvement, and overall business results. The Oklahoma Star Incentive Program provides recognition for facilities that may not be ready to explore environmental management systems but go beyond minimal compliance to protect the environment and worker health and safety. The Department of Environmental Quality is Environmental Performance & Recognition Program

In 2001 the Pollution Prevention (P2) Program began a pilot voluntary outreach program, the Oklahoma Environmental Performance and Recognition Program (EPRP). The EPRP is based on the national Malcolm Baldrige criteria that are designed to enhance the competitiveness, quality and productivity of organizations. The criteria provide a systems perspective for understanding performance management and reflect validated, leading-edge management practices. The criteria represent a common language for communication among organizations for sharing best practices and serve as the model for performance excellence. The EPRP

incorporates environmental management into the traditional Baldrige criteria.
An easy-to-use questionnaire helps to assess organizational performance and identify areas for improvement. Based on the Baldrige Criteria for Performance Excellence, the questionnaire helps to focus improvement and communication efforts on areas needing the most attention. This process provides facilities the opportunity to explore ways to integrate P2 into their core business practices.

The EPRP is a public recognition and technical assistance program that acknowledges and supports businesses or organizations with a vision and desire to move towards environmental excellence and long-term environmental and economic sustainability. Participants can enter the program and be recognized at one of three levels—Commitment, Achievement, or Excellence. The levels are designed to engage organizations at all stages of environmental management system implementation, and to encourage progressively higher system development. The goal of the EPRP is to encourage organizations to improve their environmental programs over time.

OK Star Incentive Program
The OK Star Incentive Program is another voluntary program that ranks participants on three (or four) levels, Bronze, Gold, Silver and Platinum. Each level is achieved by meeting specific performance criteria and sector-specific tracks ensure meaningful performance criteria for participants. The program will recognize facilities that achieve and maintain compliance and go beyond the regulations to protect the environment and promote employee safety. A review committee will review applicants to determine the level of achievement to be awarded. Facilities will be provided with logos and decals to be displayed on location and used in advertising. Additionally, the agency will provide media promotion in recognition of a facility's accomplishments.

The P2 Program and partners will work together with businesses that participate in the OK Star Incentive Program to promote compliance, waste reduction, energy efficiency, environmentally preferable purchasing, and resource conservation. These participants will be recruited and encouraged over time to participate in the EPRP. The experience and knowledge gained through the incentive program should complement recruitment efforts.

Arkansas
The Arkansas Department of Environmental Quality (ADEQ) is beginning the process of implementing its own Environmental Management System (EMS. By implementing an EMS, ADEQ's employees will receive the awareness and training that they need to better serve the regulated community. In addition, ADEQ hopes to serve as a catalyst for other state agencies and businesses to implement their own EMS.

ADEQ was recently accepted as a Hospitals for a Healthy Environment (H2E) Champion. The P2 Program will be working with the Arkansas Department of Health, the Arkansas Hospital Association and other healthcare organizations to promote H2E in Arkansas. During 2004-2005 the P2 Program will host several H2E workshops statewide. There are early signs of great of interest and support for H2E around the state.

Arkansas' P2 Program will fund the construction of a web site for secondary materials exchange that will be free to Arkansas businesses. The web site will be run out of ADEQ's Solid Waste Division and it will be linked to materials exchange web sites across the nation.

Texas
Texas EMS program provides incentives for regulated entities that adopt and implement a results-based EMS. To receive incentives, regulated entities must have an EMS approved by the TCEQ either through a TCEQ audit or through an approved third party audit. The TCEQ is still

in the process of developing guidance for participation in this program. There are many benefits to implementing an EMS, including both environmental improvements and costs savings. Additional benefits for facilities that get their EMS approved by the TCEQ include regulatory incentives and recognition.

New Mexico

The Green Zia Environmental Excellence Program is a voluntary program designed to support and assist all New Mexico organizations to achieve environmental excellence through continuous environmental improvement including effective energy management, water conservation, and other resource management. The program encourages integration of environmental excellence into business operations and management practices through the establishment of a prevention-based environmental management system. The Governor of New Mexico makes acknowledgements and awards annually to organizations that successfully participate in the program. Large and small organizations are encouraged to participate.

The Green Zia Program is administered by the New Mexico Environment Department and the New Mexico Energy, Minerals and Natural Resources Department with guidance and implementation from the New Mexico Environmental Excellence Alliance.

Louisiana

The Louisiana Environmental Leadership Program (LaELP) is a voluntary program sponsored by professional, environmental, industrial, and municipal associations. The Louisiana Department of Environmental Quality provides financial support for the program. Supplemental support for selected activities is provided by the sponsoring organizations. Any industrial facility, federal facility or parish/municipal governmental unit committed to improving the quality of Louisiana's environment through pollution prevention is eligible to join the program as a participating member.

The progression is clear. The Region 6 Pollution Prevention and Business Assistance programs and partners assist participants in moving from awareness to project implementation to a strong, ongoing system to assure measured continuous environmental improvement.

economic

A Global View of Corporate Sustainability

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> *It really doesn't matter what they do in Washington in trying to reduce environmental regulations. We are a global company and play by a global set of rules.* Dr. Braden Allenby, Vice President, Environment, Health and Safety AT&T, (Allenby, 1996)
>
> *We are committed to reducing waste and pollutants, conserving resources, and recycling materials at every stage of the product life cycle.* (General Motors 2004)

Life-cycle oriented environmental management (LCOEM), extended producer responsibility (EPR), supply chain environmental management (SCEM), product and packaging takeback, waste electrical and electronic equipment (WEEE) mandates…. Since the early 1990s these terms have been central to a key global environmental trend that affects the ways that firms world wide conduct their activities. As Oklahoma considers how to shape environmental policy that balances both the need for clean air, water and land with issues of jobs and economic development, it is critical that policy makers understand this trend and its implications both on Oklahoma and on its businesses. This key trend is the transition that many other governments and firms are undergoing towards a life-cycle perspective on environmental protection and performance.

Life-cycle Oriented Environmental Management

The'"life-cycle" trend stems from a growing set of pressures for firms to consider the environmental impact of their actions throughout the entire physical system life-cycle of their products or services. The phrases that started this essay all refer to environmental management approaches that require the firm to manage more than just the specific emissions and pollutants from given facilities.

As societies around the globe have asked firms to be better environmental citizens, the search for continuous improvement in the firm's ability to manage its environmental "footprint" has caused an evolution in "green" management from simple compliance to more proactive (and more uncertain) pollution prevention methods and beyond. Much of this evolution has occurred because of the recognition by firms that their effect on the environment is a critical business issue (e.g. Porter & van der Linde 1995).

The logic is really quite compelling i.e. every dollar of material going out a smokestack, down a sewer pipe or into a trash receptacle is a dollar that can not go into profits. Simply put – pollution is waste. However, the acknowledgement of "green" issues and benefits has not been proactive enough. Firms are under increasing pressure to manage their'"green footprint" beyond their own boundaries towards the entire life-cycle of their products from the creation of inputs to the final disposition of outputs (e.g. Sharfman Ellington and Meo, 1997; Steger 1996). A diverse body of pressures and incentives has developed that pushes firms to adopt life-cycle oriented environmental management (LCOEM) where suppliers' and customers' requirements and actions become an integral part of the focal firm's environmental management process (Sharfman et. al. 1997).

The pressures/incentives for firms to adopt LCOEM come from such disparate sources as the Dutch regulations concerning required industry-level Life-Cycle Analysis of products. In this approach, the government of the Netherlands requires that firms in specified industries examine

every input to a product at every stage of its development and determine what the environmental impact is regardless of whether it was their own process or not.

In 1996 the then Lucent plant in Oklahoma City sold telephone switches to the Dutch government. They had to provide Life-cycle data on the switches and agree to take them back at the end of their useful lives. Further, the U.S. government has imposed regulations on Chlorofluorocarbon (e.g. Freon) labeling in supplied products. If your firm's supplier uses these highly regulated chemicals then you are responsible for labeling your product to that effect.

As I discuss in more depth below, the European Union product and packaging takeback initiatives place extensive pressures on firms to address product end-of-life issues. Further, leading firms are raising the standard for others in their industries by using LCOEM approaches for competitive advantage (e.g. AT&T, Dow Chemical and Interface Carpeting). In addition, professional business organizations (e.g. World Business Council for Sustainable Development) are exerting normative pressures on firms to adopt more life cycle oriented approaches.

Much of the impetus for the transition to more life-cycle oriented approaches has come from initiatives mainly in the European Union (EU) and particularly from the northern European members (Germany, Netherlands, Sweden) plus non-EU member Norway. We see this perspective in the following statement on Integrated Product Policy (IPP) from the European Consultative Forum on the Environment and Sustainable Development (2000) established by the European Parliament:

> *The Amsterdam Treaty makes sustainable development an explicit goal of the European Union. It states that integration of environmental concerns into all sectors is the key to achieving this goal. The European Union is still primarily an Economic and Monetary Union. Therefore, the integration of environmental provisions into production policies is an important step in meeting the goals of the Amsterdam Treaty.*
>
> *With an IPP the Commission intends to cover all conditions of production as well as consumption and their environmental effects by taking a life-cycle perspective as a lead principle. An integrated product policy avoids shifting environmental problems between different media and stages of a product's life-cycle.*

We see similar philosophies in other EU treaties such as'"The Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal" (the 'Basel Convention'). As reported on the EU treaties (2004) webpage:

> *A central goal of the Basel Convention is to protect human health and the environment by minimizing hazardous waste production whenever possible through environmentally sound management. The convention requires that the production of hazardous wastes is managed using an 'integrated life-cycle approach', which involves strict controls from its generation to storage, transport, treatment, reuse, recycling, recovery and final disposal.*

Next, I present a sampling of the regulatory constraints that firms face as they address life-cycle (particularly end-of-life) issues for products and packaging. Note that "takeback" means exactly what it sounds like. When a consumer or a business disposes of a product or packaging covered by the takeback legislation, the original producer must take the item back (or pay someone else to) and recycle or reuse it. All of the following information was adapted from the website of Raymond Communications, (www.raymond.com) publishers of Recycling Laws International.

1. The European Union Waste Electrical and Electronics Equipment (WEEE) directive requires companies to ensure takeback of end-of life electronic products. The directive includes nearly any product with a battery or a cord, from tools to toasters; sewing machines, mowers, computers, phones, small and large appliances, toys, mainframes, peripherals, vending machines, medical and industrial/commercial equipment. The directive may cover electronic items in motor vehicles. Local governments must collect 4 kg per capita of WEEE. Companies must be financially responsible to collect historic waste as well, through collective organizations. Manufacturers selling to businesses must take back one-for-one only, under proposed amendments.

2. Currently 13 countries already mandate electronics takeback. Within about five years, Raymond estimates 28 countries with such laws.

3. In addition, 20 countries also mandate takeback of rechargeable batteries, and the EU is expanding the directive to include a wider range of batteries.

4. Note that 28 countries now have fees on all types of packaging as well, costing industry about $15 billion in Europe alone.

5. There are already nine cooperative collection schemes operating in Europe for electronics recycling. Sony, Electrolux, Braun, and Hewlett-Packard have formed an alliance to do their own pan-European collection scheme.

Not all of the regulatory schemes for end-of-life environmental issues are European. While slow to take hold in the US, some movement is occurring:

1. Maine's legislature has passed the nation's second major electronics waste bill, but without an advance recovery fee (found in California's legislation), making it the first to enact a straight "producer responsibility" law for cathode ray tube devices.

2. U.S. states proposed more than 52 electronics waste bills in more than 26 states in 2003. Many of them were more stringent than the EU directives.

3. California recently enacted an advance recovery fee on cathode ray tubes to pay for e-waste recycling, though implementation of all new bills has been temporarily halted for the new governor to review.

4. At last count, 38 states currently have e-waste collection programs of some sort (mainly voluntary), according to Resource Recycling Journal.

5. The majority of Canadian provinces have the legislative authority to require takeback of electronics. Industry has agreed on a visible fee concept, as is negotiating with some of the provinces. There is no word on if the provinces will want to require stewardship on more than just computers, peripherals, and TVs, the items discussed by industry.

(Adapted from Raymond Communications, http://www.raymond.com/durables/)

As such, both proactive European firms and American companies doing business in Europe have begun to integrate a life-cycle perspective into their operations as we see from the quotes below:

> *We will strive to create products that are safe in their intended use, conserve energy and materials and prevent pollution throughout the product life cycle including design, manufacture, use and end-of-life management* (Apple Computer 2003)

> *Responsible production of Baxter's life-enhancing products requires taking responsibility for their impact on the environment and society. This responsibility continues throughout a product's lifecycle, from research, development and design, through selection and use of raw materials, manufacturing, packaging, distribution, product use, reuse and disposal. This demonstrates Baxter's commitment to "doing the right thing,"*

and it makes good business sense by reducing manufacturing costs and meeting legal and regulatory requirements. (Baxter Healthcare 2004)

ABB is committed to sustainable development which we support by offering our customers ecoefficient products and systems that achieve reduced environmental impact over their complete lifecycles (ABB 2004)

Implications

Several years ago when we published our 1997 article on life-cycle oriented environmental management (Sharfman et. al 1997), a business journalist asked me —"Well what does this mean for companies here in the heartland?"

My answer then and now is "perhaps nothing, perhaps a lot – it depends on what they do."

For the firm who sells nothing outside of Oklahoma and does not plan to change that, this trend may mean little or nothing.

However for the firm currently engaged in or considering a more global approach to business, then they, like AT&T in the quote that started this paper, must become a global company and play by a global set of rules. Inherent in that global set of rules is a growing life-cycle perspective on environmental issues. Even if the firm is "only" going to export overseas, then the packaging and product takeback rules add costs and competitive disadvantages with which they must cope. As such""extended producer responsibility" regulations become more common in the US, similar costs and disadvantages accrue to the firm who lags the industry's leaders even domestically.

If a given company is an industry that even may be affected by these regulations, then preparing today for tomorrow's challenges is the best defense the firm can offer.

The real question of interest for this Town Hall however, is what can/should Oklahoma do regarding these two trends? The European movement toward product and packaging takeback was stimulated largely by a dearth of landfill space and a desire to keep materials with economic value from being wasted. While Oklahoma has lots of potential landfill sites both state and federal regulations make the creation of more landfills increasingly more difficult. Further sticking materials with economic value into a hole in the ground does not make logical sense.

Finally, current research suggests that particularly with electronics, many of the materials that would be land-filled qualify as toxic waste requiring even more expensive landfill systems. The solutions to this set of issues are not obvious. Additional regulation at the state level requiring product or packaging takeback would likely be met by enormous resistance by a legislature that won't even pass bottle deposit bills. Therefore:

Recommendation #1
Develop a partnership among state/local government, private industry and non-governmental groups to build a voluntary take-back infrastructure for both high use products and packaging.

It seems particularly clear that for firms doing business overseas and even for many solely domestic producers, takeback is the future. Oklahoma has few firms who are large enough to develop any needed infrastructure on their own. However, a partnership approach may allow government, industry and advocacy groups to work together both to limit the input to Oklahoma's landfills but also to prepare Oklahoma companies for the future.

Perhaps state resources could best be used to provide incentives for participation in such an infrastructure. By helping develop a cooperative takeback infrastructure, Oklahoma helps makes local businesses more competitive in global and national markets, reduces the flow of materials into landfills and leverages limited state resources.

Recommendation #2
Develop a state-wide technical assistance and training function to aid firms who wish to address packaging and product takeback or global environmental performance trends on their on their own.

Relatively few firms in Oklahoma are even aware of the growing global trend towards product and packaging takeback. By providing training, technical assistance and education in this emerging area, firms that wish to globalize or simply wish to prepare for the future in the US will be better able to do so. Implementing this recommendation also helps Oklahoma businesses become more competitive.

Recommendation #3
Examine and develop ways to expand business-based solutions to the waste materials problem.

The recognition that waste materials have economic value takes many forms. One of the ways firms have recognized this value is in the budding re-use market. Recycling has been a part of American industry for several decades and while valuable, it is limited. However, new momentum has developed in the re-use market. As an example, Ashland Distribution (a division of Ashland Chemicals) has established a market for waste chemicals.

For example, one firm might have some number of drums of 97% pure solvent that has been reclaimed from a cleaning process. While it may no longer be pure enough for the original firm's application, it might be perfectly useful for another, less stringent use. By helping firms find creative ways to approach their waste problems (e.g. electronic markets etc.) the State of Oklahoma can leverage its considerable resources while still keeping the solutions in the private sector.

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Xerox and Corporate Sustainability

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Introduction

There is only one constant in today's business world'— and it is change. Regulatory schemes are more complicated. Customer expectations have grown. Pressing environmental problems of the 21st century, such as global climate change and rapid deforestation, pose a sense of urgency. In response, our company has committed to two new corporate initiatives.

First, we have made formal a continuing commitment to reduce our energy consumption and associated greenhouse gas emissions across the company.

Second, we have deployed a stringent set of requirements to companies that supply paper to Xerox for resale. These requirements will ensure that Xerox paper is sourced from sustainably managed forests.

Additionally, we are investing in technology to reduce the environmental impact of our products. We are also designing products and solutions that are usable by a greater base of potential customers, including those with disabilities.

Xerox believes passionately that good citizenship is good business. It's good for our communities, good for our people . . . and, ultimately, good for Xerox. It means protecting our employees, our communities, and the environment from harm, and it means striving toward a sustainable world.

Working to Become a Sustainable Company

Reduced Energy/Greenhouse Gas Emissions

Energy management is not new for Xerox. Over the last several years, we have reduced energy consumption within our operations through the use of high-efficiency lighting, the installation of motion detectors that turn off lights when rooms are unoccupied, and the implementation of energy management programs. We have also reduced energy consumption associated with the manufacture of Xerox products through our remanufacturing and parts reuse program. By reusing parts, Xerox avoids the energy expenditures associated with the extraction of raw materials and fabrication of parts. In addition, Xerox designs its products to be energy efficient, allowing customers to reduce their consumption of energy and associated greenhouse gases.

In 2003, Xerox strengthened its commitment to reducing energy consumption and associated greenhouse gas emissions across all operations. We have developed a methodology for measuring greenhouse gas emissions and established a baseline inventory for the U.S. and are expanding this company-wide. In 2004, Xerox will set corporate targets for reducing greenhouse gas emissions through 2012. Xerox recently joined the U.S. Environmental Protection Agency's Climate Leaders and The Business Roundtable's Climate RESOLVE. Both programs are voluntary initiatives to help companies develop long-term climate change strategies.

Paper Sourcing

As one of the largest brands of cut-sheet paper in the world, Xerox recognizes its obligation to ensure the responsible management of forests that provide raw materials for the production of paper. To this end, Xerox is working toward a sustainable future by reducing the environmental impacts of its own operations and those of its suppliers. Xerox adopted in 2000 an environmental position that states that our goal is to source paper from companies committed to sound environmental, health, and safety practices and sustainable forest management.

Our intent is to protect the health and integrity of forest ecosystems, conserve biological diversity and soil and water resources, safeguard forest areas of significant ecological or cultural importance, and ensure sustainable yield. Companies must be committed to compliance with all applicable environmental, health, and safety regulatory requirements in the countries where they operate. In support of our position, we have issued a set of stringent requirements for companies who provide paper to Xerox for resale.

The requirements, which cover all aspects of papermaking, from forest management to production of finished goods, will be included in our existing supplier qualification process. All Xerox paper suppliers worldwide must meet these new requirements to continue doing business with Xerox and must submit detailed documentation, on an annual basis, verifying conformance. Key elements of the requirements include:

- Commitment to compliance with all applicable environmental, health, and safety regulatory requirements, including forestry codes of practice and regulations governing legal harvesting of wood.

- An effective mill environmental management system and objectives for continual improvement in environmental performance above and beyond regulatory compliance.

- An effective procurement process that: (1) Ensures the exclusion of illegally harvested wood raw materials (2) Ensures the exclusion of wood raw materials derived from forest areas of significant ecological or cultural importance unless certified to a Xerox-accepted sustainable forest management standard and (3) Encourages all suppliers of wood raw materials to practice sustainable forest management.

- Strict limits on the use of hazardous materials, including exclusion of elemental chlorine, in the processing and content of Xerox papers.

We recognize that one of the most significant challenges paper companies will face in meeting Xerox's requirements will be to demonstrate that they are safeguarding forest areas of significant ecological or cultural importance. Xerox fully supports multi-stakeholder efforts to develop information sources and tools that will help suppliers identify these areas on their own forestlands and in their procurement of wood raw materials from third parties. Xerox expects its suppliers to take full advantage of these resources as part of their sustainable forestry efforts.

Waste-Free Factories

For more than a decade, Xerox has deployed its Waste-Free goal of making Waste-Free Products in Waste-Free Factories to help our customers attain Waste-Free Workplaces. This effort has produced dramatic improvements in the environmental performance of our company. In moving toward a sustainable future, we recognize that we must further reduce the environmental impact of Xerox's own operations. At the same time, we must continue to extend the reach of our environmental, health, and safety policies across the product life cycle. An ambitious set of Waste-Free goals and supporting programs have helped us put this commitment into practice. As a result, each new generation of Xerox products offers increasing functionality while conserving energy and materials and requiring fewer hazardous substances throughout the product life cycle.

Xerox continued to make good progress toward our Waste-Free Product goals in 2002:

- Xerox equipment remanufacture and supplies reuse/recycle programs diverted 161 million pounds of material from landfills.

- Energy-efficient product features enabled energy savings of 37 million therms (1.1 million megawatt hours). Parts reuse saved an additional 14 million therms (400,000 megawatt hours) of energy.

- All newly introduced products achieved Xerox's strict standards for minimal use of hazardous materials and emissions of noise, ozone, and dust.

The efforts of Xerox engineering teams to incorporate increasingly challenging targets for energy efficiency, reuse/recycling, and minimized use of hazardous materials into future product designs will ensure continued advances in these areas. The deployment of a revised, more stringent environmental, health, and safety standard for Xerox packaging will drive progress in this area as well. One measure of the success of our Waste-Free focus is the number of Xerox products that meet the world's most widely recognized certifications for product environmental performance—the international ENERGY STAR and Canada's Environmental Choice EcoLogo.

Designing for Reuse

Xerox has been able to maximize the end-of-life potential of products and components by incorporating reuse considerations into the design process. Machines are designed for easy disassembly and contain fewer parts. Parts are designed for durability over multiple product life cycles. Parts are also easy to reuse or recycle, and are coded with disposition instructions. As a result, equipment returned to Xerox can be remanufactured — rebuilt—— to as-new performance specifications, reusing 70 to 90 percent by weight of machine components, while meeting performance specifications for equipment with all new parts.

Xerox has further extended its ability to reuse parts by designing product families around modular product architectures and a common set of core components. These advances offer Xerox multiple options for giving new life to old equipment. A returned machine can be rebuilt as the same model through remanufacture, converted to a new model within the same product family, or used as a source of parts for next-generation models. Improved processes for forecasting equipment returns from customers have allowed Xerox to increasingly rely on previous generations of equipment as a source of components for products in development.

Xerox products whose designs are based on previous models may have 60 percent of their parts in common with older equipment. As the pace of technological innovation has shortened product life cycles, our ability to reuse parts across product generations has become increasingly important.

The Green World Alliance
Reuse and Recycling of Supplies

The Xerox Green World Alliance reuse/recycle program for supplies is a central element of our strategy to achieve Waste-Free Product goals for efficient use of materials and energy. Partnerships with Xerox customers have made this program a success. In 2002, the Green World Alliance prevented more than 18 million pounds of waste from entering landfills worldwide.

Xerox has well-established methods for collecting and reprocessing spent print/copy cartridges, toner containers, and waste toner from Xerox office and production equipment.

Prepaid return labels and the packaging from new supplies allow customers to ship these materials back to Xerox for reuse and recycling.

For cartridges and waste toner bottles, Xerox includes return labels in boxes of new supplies. Labels for toner containers are available from Xerox upon request.

Returned products are cleaned, inspected, and then remanufactured or recycled.

Remanufactured cartridges, containing an average of 90 percent reused/recycled parts, are built and tested to the same performance specifications as new products.

Similarly, waste toners qualified for reuse may account for 25 percent of the weight of new toner, without any compromise in toner functionality. The reuse of waste toner saves several million dollars each year in avoided raw material costs. Through the Green World Alliance, customers worldwide returned more than 6.5 million cartridges and toner containers to Xerox in 2002.

Nearly 90 percent by weight of these returned materials were remanufactured or recycled. Xerox also processed 2.4 million pounds of post-consumer waste toner for reuse. The plastic bottles customers used to return waste toner to Xerox — more than 190,000 in number—— were recycled.

At the same time, Xerox continued its practice of designing toner containers to incorporate post-consumer recycled plastic, achieving an average of 36 percent recycled content for toner bottles sold in 2002 (this figure is based upon North American sales).

Xerox is strengthening the Green World Alliance program in several ways.

We have upgraded our Green World Alliance web site, making it possible for customers to download prepaid return labels directly from the site rather than requesting them by phone or e-mail.

Xerox is continuing to qualify new cartridges and black waste toner for remanufacture. Engineers are also investigating methods for remanufacturing color waste toner and identifying reuse and recycling options for black toners not suitable for remanufacture. One such option is using reprocessed waste toner as a colorant in newly built plastic parts.

All of these efforts are helping us move toward our goal of responsibly managing all waste associated with Xerox supplies.

THE DOCUMENT COMPANY

XEROX®

The Built Environment & Sustainable Development

Dru Meadows, AIA, CCS, CSI and, Chuck Bell, AIA, NCARB

About the Authors

Dru Meadows, AIA, CSI, CCS and Charles E. Bell, AIA, NCARB are principals of theGreenTeam, Inc., a strategic environmental consulting firm specializing in building industry issues. theGreenTeam attained registration of its Environmental Management System (EMS) to the International Organization for Standardization's (ISO) 14001 Standard in October 2001 – becoming the first U.S. company of its kind to receive the international recognition.

theGreenTeam, Inc. is a small firm with a large impact. During the year 2003, annual savings attributable to *theGreenTeam's* efforts included estimated savings for its clients of:

- 37 million ($US) in energy costs;
- 524 million kWh of electricity;
- 8.4 million gallons of water;
- 87 million ($US) in labor costs;
- 65 tons of construction materials;
- 319,000 metric tons of CO^2.

Projects on which Ms. Meadows and Mr. Bell consulted have received numerous awards, including: the *White House Closing the Loop Award 1999; AIA Top Ten Environmental Projects 1998; Oklahoma Governor's Award for Environmental Achievement 1996*; *National Council of Commercial Builders Edison Award 1995*; *United Nations Award - Earth Summit Global Sustainability Award 1994, and AIA - Sustainable Communities Strategies and Materials*

Abstract*: Oklahoma and Oklahoma companies are well positioned to respond to a fast-growing market demand for "green building" and""sustainable development." This market interest is voiced by building industry professionals, manufacturers, corporations, financial institutions, governmental agencies, and customers. It is expressed in developed countries and developing countries.It is demonstrated in new regulations, standards, and voluntary programs.*

The green design movement is not new. It was the only method of building until the Industrial Revolution (although no one referred to it as "green building" - it was just "building"). In the mid-seventies energy crisis, there was a flurry of solar homes and off-the-grid building with tires and aluminum cans. That is still how some people envision "green building." However, over the last two decades, the green design movement has matured. It has acquired a new popularity…. and a new respect due to both the positive economic and positive environmental impacts of green buildings.

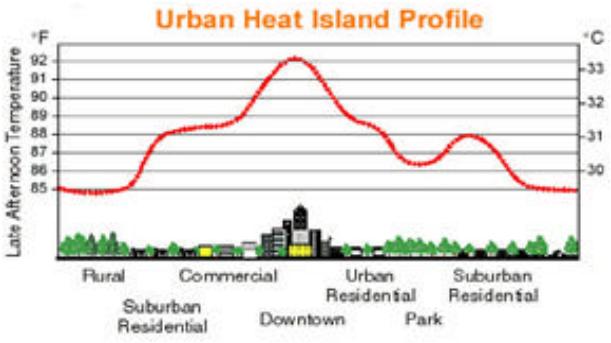
A "responsible balance" is not only good for the environment - but great for businesses

The building industry annually accounts for an estimated: 40% of world's energy usage; 16% of world's water usage; 3 billion tons of raw materials (approximately 40 % of total); and 15 - 20 % of the waste stream.[1] OSHA attributes an average productivity loss of 14 minutes per day (approximately 3.0 %) due to poor indoor air quality in buildings.[2]

In spring of 2003, the Center for Disease Control and Prevention estimated that approximately 434,000 U.S. children aged 1 – 5 years had blood lead levels greater that the government recommended level of 10 micrograms of lead per deciliter of blood [3] attributable primarily to lead paint and lead pipes in buildings.

On hot summer days, urban air can be 2-10 degrees Fahrenheit hotter than the surrounding rural areas.

Not to be confused with global warming, scientists call this phenomenon the "urban heat island effect." Heat islands form as vegetation is replaced by asphalt, concrete and other structures. These surfaces absorb – rather than reflect – the sun's heat, causing surface temperatures and overall ambient temperatures to rise. The displacement of trees and shrubs eliminates the natural cooling effects of shading and evapotranspiration (a natural cooling process in which water transpires from a leaf's surface and evaporates into the atmosphere, reducing ambient temperature).[4]



There is national and international interest in these numbers. Governmental agencies, schools and universities, hotels and tourism, healthcare, residential and consumer, and corporations are interested.

Governmental Agencies:
Numerous local, state and regional agencies are racing to adopt voluntary (and mandatory) green building programs, 'smart growth' initiatives, and related sustainable development legislation.

Examples of green building programs and standards include:

policy/program example:
The U.S. Postal Service incorporated green building requirements into its master documents, developed 'beta test projects' including the First Green Post Office in Fort Worth, TX, and conducted monitoring and evaluation programs to assess return on investment for the eco-efficient measures.

The U.S. Environmental Protection Agency developed the Federal Guide for Green Construction Specs through a consensus building process that included review/participation by federal agencies and by trade, environmental, and professional organizations; and is currently entering the public review phase.

theGreenTeam, Inc. is also working with state/ municipal agencies to assist in creating comprehensive, feasible, and measurable programs in support of sustainable development.

- **Local:** Alameda, Atlanta, Austin, Boulder, Chicago, Chula Vista, Denver, Frisco, Grand Rapids, Hudson Valley, Kansas City, Portland, Santa Barbara, Schenectady, Scottsdale

- **State:** California, Colorado, Hawaii, Illinois, Maryland, Michigan, New Mexico, New York, North Carolina, Oregon, Pennsylvania, Vermont, Washington, Wisconsin

- **U.S. Government agencies:** General Services Administration, Army, Navy, Air Force, Environmental Protection Agency, National Aeronautics and Space Administration, National Park Service, Department of State, Department of Health and Human Services

- **National-USA:** Energy Star, BEES (Building for Environmental and Economic Sustainability), Good Cents, LEED (USGBC's Leadership in Energy and Environmental Design), HERS (Home Energy Rating System), WBDG (Whole Building Design Guide)

- **National-other:** Canada, China, Denmark, Finland, France, Germany, Japan

- **International:** GBC (Green Building Challenge), ISO (International Organization for Standardization), ASTM International

"The Energy Policy Act of 1992 and Executive Order 13123 require Federal buildings to reduce their energy use by 35 % by 2010 (compared to 1985). Executive Order 13123 also requires Federal agencies to 'apply [sustainable design] principles to the siting, design, and construction of new facilities.'

The Office of Management and Budget's Circular A-11 encourages agencies to incorporate Energy Star® or LEED™ (the U.S. Green Building Council's Leadership in Energy and Environmental Design rating system) into designs for new building construction and renovations."[5] U.S. Federal Executive Order 13101 supports environmentally preferable products and services.

The 2002 Farm Bill - Section 9002, Federal Procurement Of Biobased Products, requires each Federal Agency to develop a procurement program which will assure that items composed of biobased products will be purchased to the maximum extent practicable and which is consistent with applicable provisions of Federal procurement law.

K-12 Schools & Universities: Communities are demanding 'high performance' schools across the USA. 'High performance' refers to high environmental building performance that supports high academic performance. The'U.S. Department of Energy publishes a model program - *High Performance Schools*. State and local initiatives include: Arizona, California, Colorado, Florida, Illinois, Indiana, Maine, Maryland, Massachusetts, Minnesota, Mississippi, New Jersey, New York, North Carolina, Oregon, Pennsylvania, Texas, Washington, Washington DC.

> *policy/program example:*
> *Rice University is incorporating environmental recommendations into the building design standards of its master campus program.*
>
> *The Oklahoma State University (OSU) Environmental Institute promotes applied environmental studies in a variety of disciplines, encouraging the active involvement of the corporate community.*

Not surprisingly, many universities, typical early adopters of progressive approaches that later become mainstream, have green building initiatives. The National Wildlife Federation's *State of the Campus* Report[6] assessed data gathered from over 1000 of the nation's 4,100 colleges and universities and 64% report they now include environmental performance criteria in their building programs. The University of Arkansas is a prime example. It has recently undertaken a building on campus that, although not mandated by requirements, will be designed and built utilizing the LEED certification program.

> *policy/program example:*
> *theGreenTeam, Inc. has provided preliminary environmental program/policy considerations to the Architect for the new Tulsa Convention Center.*

Hotels, Conference Centers, Tourism: According to the Green Hotel Association, 43 million US travelers have a preference for sustainability. This represents only 5% of total US travelers as per the Travel Industry Association of America; but an affluent and vocal 5% and one that is rapidly growing. There is strong trade organization support and related initiatives that promote green hotels/travel. New conference centers are marketing very successfully with green, courting both organizational customers and high-profile green municipalities such as Chicago, Portland and Austin. The US EPA's Pollution Prevention Division developed the Green Meetings Initiatives[7] to provide conference planners and

policy/program example:
Tulsa Partners and the Tulsa Zoo, with assistance from several Oklahoma firms, are designing an Eco-Safe house to educate the community regarding both green building issues and disaster preparedness. It will provide education about building materials and methods & about how building materials and methods affect the local and regional ecosystems, impacting the quality of life in the community.

suppliers of conference services, easy access to environmentally friendly goals of conference planning. The Initiatives are fairly extensive and address: green meetings/conferences (this refers not to the topic but to the administration of the conferences), green hotels, green travel, and related EPA programs.

Ecotourism, travel to explore the natural world and in a manner that respects local ecosystems, is established as a politically valuable concept. Over 50 countries have developed special policies and strategies focused on ecotourism at a national level. The World Ecotourism Summit (WES) was attended by more than 1100 delegates from 133 countries.[8] In the US, ecotourism is largely associated with the nation's parks.[9] The United States National Park Service estimates that the 273 million visits to American national parks in 1993 generated direct and indirect expenditures of US$ 10 billion and 200,000 jobs.[10] The U.S. Fish and Wildlife Service estimates that in 1995, nearly 25 million visits to over 100 national wildlife refuges generated an estimated $245 million from non-consumptive uses only (e.g. excluding hunting and fishing).[11] The World Travel and Tourism Council estimates that travel and tourism's direct, indirect, and personal tax contribution worldwide was over US$ 800 billion in 1998 - a figure it expects to double by 2010.[12] Municipalities are starting to embrace the concept of ecotourism, developing policies and regulatory programs. Virginia, Washington, Maine, New York, and Hawaii, all boast ecotourism programs.[13]

Residential: Homeowners are familiar with escalating energy costs. Energy efficient options are available for a wide variety of applications. Simply installing proper insulation, compact fluorescent light bulbs, and energy efficient appliances can make a house "economically equivalent to a barrel-a-day oil well."[14] Oklahoma financial institutions that make energy efficient mortgages available include: American Capital Mortgage Company; 6600 N. Meridian, Suite 250; Oklahoma City, OK 73116; 405-848-3600; Jim Miller Vice President; and American Bank of Oklahoma; PO Box 1060; Skiatook, OK 74040-5060; 918-396-7300; Thomas L. Merell, Vice President.

Water can also impact utility bills. Much of the water and wastewater infrastructure in the U.S. was built during times of economic growth (the 1890's boom, a World War I boom, a roaring '20s boom and the massive post-World War II baby boom).[15] This infrastructure is now approaching the end of its useful life[16] and the cost of replacing piping and treatment plants is estimated at as much as $1 trillion over the next 20 years. This is a cost which will be born by the homeowner. One way of reducing the cost is to reduce the amount of water and wastewater to be treated, saving on infrastructure costs and management costs. Another is to implement policy and program options that promote sustainable water systems (rainwater harvesting, grey water reclamation, and

policy/program example:
Wal-Mart has conducted 'beta test projects' for various eco-efficient measures, subsequently revising its volume build programs and polices based on the results.

Nestlé Waters North America conducted a brainstorming session resulting in development of new green building design standards for its bottling plants. As a result, the first building constructed to the new guidelines, the Ice Mountain Facility in Michigan, was awarded certification through the US Green Building Council's LEED Program.

constructed wetlands or living systems for wastewater treatment).

Corporate: Corporations are responding to environmental demand from consumers and from their shareholders.
Socially Responsible Investing (SRI), which includes various financial screens to support environmental and social initiatives, has increased significantly, representing over $2.4 trillion as of 2001. SRI funds manage an estimated $1 out of $8 under professional management. In February 2004, California State Treasurer Phil Angelides proposed the Green Wave Initiative, a program for the state's public pension plans to support environmentally responsible investing. The proposal calls for the California Public Employees' Retirement System and the California State Teachers' Retirement System to funnel $1.5 billion into environmentally-sound investments.[17]

Healthcare: Healthcare is another increasingly vocal sector promoting industry awareness of environmental issues. The American Society for Healthcare Engineering's Sustainable Design Guidance Document asserts that "building design and construction practice can be shaped to protect health at three scales….Protecting the immediate health of building occupants;…Protecting the health of the surrounding community;…[and] Protecting the health of the larger global community and natural resources."[18]

Because of the growing demand for green building, green products and systems are becoming more economically viable thanks to economies of scale. This also means there are a wider variety of green products available. Concurrently, the body of scientific information available that defines product performance standards is growing and demonstrating more concretely the payback of many of these products. Additionally, many municipalities offer tax incentives for application of green building principles. For example: Austin (www.cityofseattle.net/sustainablebuilding/incentives/builtgreen_incentive.htm), Seattle (www.cityofseattle.net/sustainablebuilding/incentives/builtgreen_incentive.htm), and New York (www.nrdc.org/cities/building/nnytax.asp). A good resource for tax incentive programs is the database of State Incentives for Renewable Energy (DSIRE), developed and administered by the Interstate Renewable Energy Council and North Carolina Solar Center. DSIRE (www.dsireusa.org) lists all incentives for renewable energy by state and type and contains the source of applicable state statues and forms when available.

policy/program example:
Major healthcare providers, such as Kaiser Permanente and Catholic Charities, are implementing green building programs as well as modifying their investment portfolios to better represent environmental considerations.

Such programs endorse green building polices. They recognize that 'smart growth' is not simply building more densely in urban areas, but that it is involves coherent policies and programs to support thoughtful development (e.g. mixed use that allows urban residents to walk to parks, schools, and local groceries; or suburban development that acknowledges the potential strain on municipal resources to serve extended communities).

OKLAHOMA'S RESPONSE

There are already numerous (albeit largely unconnected) initiatives through private and public organizations in Oklahoma that align with sustainable development. If the state were to provide the comprehensive framework in which each such initiative might resonate, the synergies could be incredibly strong.

Building zoning requirements, code requirements, and/or tax incentives in support of green initiatives (for both individual buildings as well as for building development and infrastructure) could invigorate local initiatives already underway. New technologies, many already in development in the state (e.g.

roofing tiles manufactured from recycled rubber, wind generators, biomass power generators, on-demand water heaters, solar water heaters and pumping systems, and ground source heat pumps), would be enhanced by such policies.

A policy defining and protecting wildlife corridors would support a variety of local and state initiatives. More than 800 species of wildlife can be found in Oklahoma throughout the year. Parks/ preserves such as Woolaroc, Mohawk, Tallgrass Prairie, and the Western Oklahoma Wildlife Heritage Trail could capitalize on the growing interest in ecotourism. Combined with green building programs and polices, such initiative could help define Oklahoma as a forward-thinking state, able to promote the type of community and quality of life that attracts not only tourism, but also high-end companies and their employees.

Watershed management policies could benefit municipalities struggling with increasing demand for water treatment and supply, as well as assist with flood control strategies. There are numerous options to further such a goal. For example, by utilizing (and participating in development of) the ASTM standards for green roofs, the state could address performance of green roof assemblies with respect to plants, soils, drainage, irrigation, insulation, root barrier, and roofing membrane.

A green roof is an assembly that supports an area of planting/landscaping, built up on a waterproofed substrate at any level that is separated from the natural ground by a man-made structure. A green roof can: increase stormwater retention on site, improve the energy efficiency of the building, prolong membrane life, contribute to wildlife corridors and local habitat, and reduce the building's urban heat island effect.

Green roofs can reduce the stormwater runoff from the site. In summer, depending on the plants and the depth of the growing medium, green roofs retain 70-80% of the precipitation that falls on them; in winter they retain between 25-40%.[19]

We look forward to assisting the state in development and implementation of sustainable development policies. Such policies can improve the quality of life for Oklahomans, while simultaneously strengthening the economy.

End Notes

[1] Worldwatch Paper No.124.

[2] 1994 - 04/05/1994 - Indoor Air Quality - 59:15968-16039**;** Dept. of Labor Occupational Safety and Health Administration 29 CFR Parts 1910, 1915, 1926, 1928 [Docket No. H-122] RIN 1218-AB37 Indoor Air Quality AGENCY: Occupational Safety and Health Administration; http://www.osha.gov

[3] Natural Resources Defense Council; *In Profile* 01/04; page 14.

[4] Refer to the EPA's Heat Island Reduction Initiative, http://www.epa.gov/globalwarming/greenhouse/greenhouse14/reduction.html

[5] Federal Commitment to Green Building: Experience and Expectations; Office of the Federal Environmental Executive; December 2003, www.ofee.gov/sb/fgb.html

[6] www.nwf.org/campusecology/stateofthecampusreport.cfm

[7] http://www.epa.gov/oppt/greenmeetings/

[8] United Nations Environment Programme; International Year of Ecotourism – Background: In July 1998 the United Nations Economic and Social Council (ECOSOC) proposed to members of the UN General Assembly to designate 2002 as the International Year of Ecotourism (IYE). http://www.uneptie.org/pc/tourism/ecotourism/outcomes.htm

[9] For "green case studies" refer to http://www.nps.gov/renew/case.htm

[10] http://www.uneptie.org/pc/tourism/sust-tourism/economic.htm

[11] http://www.state.gov/g/oes/rls/or/19412.htm

[12] Source: WTTC/Michigan State University Tax Policy Center; http://www.uneptie.org/pc/tourism/sust-tourism/economic.htm

[13] http://www.state.gov/g/oes/rls/or/19412.htm

[14] *"On Buying the Wrong Light Bulbs (A Note on Energy Efficiency)* by Amory Lovins, AIA Environmental Resource Guide Subscription, April, 1992. Copyright 1992 The American Institute of Architects

[15] American Water Works Association, "Statement on Drinking Water Needs and Infrastructure", March 28, 2001

[16] The EPA reported that in 2000, over 20.3 million Americans drank water supplied by 4,229 community water systems that had reported violations of EPA's basic health or treatment standards. Re: Natural Resources Defense Council; *In Profile* 01/04; p 14.

[17] SocialFunds.com; http://www.socialfunds.com/news/article.cgi/article1336.html

[18] ASHE Sustainable Design Guidance Document; January 2002; http://www.hospitalconnect.com/ashe/resources/guidance.html

[19] Green Roofs for Healthy Cities; http://www.greenroofs.ca/grhcc/main.htm

Weyerhaeuser in Oklahoma

Mike Wood, Environmental Affairs Manager, Weyerhaeuser Company

Weyerhaeuser Company

Weyerhaeuser Company, one of the world's largest integrated forest products companies, was incorporated in 1900. It has offices or operations in 18 countries, with customers worldwide. Weyerhaeuser is principally engaged in the growing and harvesting of timber; the manufacture, distribution and sale of forest products; and real estate construction, development and related activities. Weyerhaeuser is:

- *the world's largest owner of merchantable softwood timber;*
- *the world's largest producer of softwood and hardwood lumber;*
- *the world's largest producer of engineered lumber products; and,*
- *the world's largest producer of softwood market pulp.*

In Oklahoma, Weyerhaeuser operates a building material distribution center and corrugated packaging sheet plant in Oklahoma City, manufactures containerboard in Valliant, and produces softwood lumber, plywood, veneer, and hardwood lumber in Wright City. In addition, the company manages over 500,000 acres of timberlands in the southeastern portion of the state.

Weyerhaeuser's Citizenship Values

At Weyerhaeuser, we strive to be responsible citizens, exemplary environmental stewards, ethical businesspeople and friendly neighbors. Our Roadmap for Sustainability report describes the numerous initiatives that demonstrate our ongoing commitment to the environment, to our employees, and to the communities in which we do business.

Many of our policies provide a framework for building mutually beneficial relationships, like our aboriginal relations in Canada, opportunities to gain land access to our forestlands and other forms of public outreach.

Our education programs reach thousands of students every year and our Weyerhaeuser Company Foundation awards millions of dollars each year to dozens of programs and organizations.

We hold ourselves accountable to these and other citizenship values by providing access to our ethics and business conduct program, helping employees act within the highest standards of ethical conduct.

Sustainability and Weyerhaeuser

In the past 50 years, corporations have assumed a significantly larger role in society. As a result, what were formerly private decisions have come to have far-reaching public impacts. In grappling with issues such as the expansion of health care, assuring equitable treatment of women and minorities, and the protection of the environment, corporations have both shaped the issues and been shaped by them.

Weyerhaeuser embraces the heightened responsibility that comes with this expanded role. We commit to operate in a way that is consistent with society's values and that is environmentally, economically and ethically sustainable. We carry out that commitment through values and systems that help make doing the right thing also the natural thing.

Sometimes society's values are clear. For example, society values a safe and healthy workplace. Reflecting that shared value, we have instituted goals, training, investigatory procedures and a tracking system to become a safer place to work.

After 10 years of steadily improved safety performance, Weyerhaeuser's current challenges are how to make every facility as safe as our safest facilities and how to raise our contractors' performance to match our own.

In other cases, society holds competing values. Communities value steady jobs. Consumers value low-priced products. Shareholders value competitive returns. How do you reconcile these values when you have a mill that can't produce at a low enough cost or isn't as profitable as its peers?

In answering this question, a publicly held corporation must balance diverse interests. Last year, we closed 12 facilities. We attempted to balance stakeholders' competing values in several ways. We did our best to improve the profitability and extend the life of those operations. In some cases, we looked for buyers who would continue to operate the facilities. If we made a decision to close, we gave advance notice, tried to transfer employees, and provided severance benefits and job-placement assistance. While the closures were a bitter pill, they made us a stronger, more competitive company.

Where society hasn't come to consensus on an issue, the process of balancing competing values can be slow, messy and marked by conflict. Society clearly values the protection of forests and species at risk. But it also values the rights of:

- *Families who own 84 percent of the private forests in the United States.*
- *Rural communities in British Columbia that may depend on the harvest of some old-growth forests to ease the transition to second-growth forests.*
- *Indigenous peoples, such as First Nations in Canada, who challenge the government's ownership of the land.*

Weyerhaeuser owns or manages forests, which puts us in the middle of this debate. But where some see conflict, we see opportunities for new solutions. We, too, believe forests and species should be protected. We view managed forests as a key part of the solution. They can provide the wood and fiber society needs, taking the pressure off more sensitive forests, which should be protected.

We're working with governments and other stakeholders worldwide to increase protected forests and stop illegal logging. For example, on the central coast of British Columbia, we're deeply engaged with environmental organizations, local communities and other timber companies in a consortium that just recommended the province expand protected areas to encompass a full third of the land base. Across the B.C. coast, we use an old-growth harvest and preservation strategy that the Rainforest Action Network praised as "courageous." To help preserve endangered caribou in the boreal forest, we recently initiated a five-year delay on harvesting more than 200,000 acres to allow time to implement a recovery plan.

On those forests allocated to producing wood and fiber, we support independent certification to verify they are being sustainably managed.

We are encouraged by the views of those who know us best - the communities that are home to our operations. In our most recent citizenship survey, a majority felt we did an excellent or good job in protecting air, water and wildlife; meeting environmental standards; and conducting business ethically. We continue to try harder to discern, reflect and respect society's evolving values.

Weyerhaeuser is a leader in an industry whose activities rely on natural resources and our role as environmental stewards is one of the most important we play. Since 1971, our environmental policy has outlined our commitments and guided our behavior. A similar policy guides our efforts to protect the health, safety and well being of Weyerhaeuser people.

In 1999, we committed to aligning all of our timberlands and manufacturing operations to the ISO 14001

Environmental Management System standard through certification by the year 2005. Today, 100 percent of Weyerhaeuser's U.S. forests are certified as meeting the standards of the Sustainable Forestry Initiative.

These policies and practices help us meet regulatory and stakeholder requirements through practicing sustainable forestry and reducing pollution while guiding our efforts to conserve natural resources.

Weyerhaeuser's Environmental Policy
It is Weyerhaeuser's core policy that employees at all levels will work to ensure that we comply with applicable environmental laws, regulations and other requirements to which the company commits, and to continually improve our environmental performance wherever we do business.

Employees are accountable for ensuring compliance with applicable laws and for managing and operating our businesses to conform with the company's goals of:

- *Practicing sustainable forestry*
- *Reducing pollution*
- *Conserving natural resources through recycling and waste reduction*

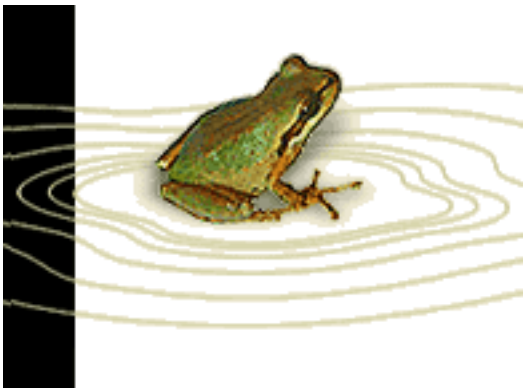
In countries where applicable environmental laws are less stringent than those in the United States and Canada, we will operate in a manner comparable to North American requirements. In conducting our business, we are committed to:

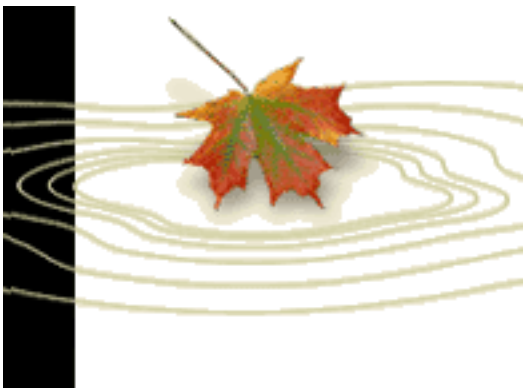
- *Understanding and responding to public health and environmental impacts of our operations and our products.*
- *Ensuring that employees are trained and are empowered to actively participate in the company's environmental management process.*
- *Actively supporting environmental research and technological advancement and, where appropriate, adopting innovative practices and technology.*
- *Promoting the development and adoption of environmental laws, policies and regulations that are balanced, are technologically sound and use incentive-based approaches for improving environmental performance.*
- *Managing forestlands for the sustainable production of raw materials while protecting water quality; fish and wildlife habitat; soil productivity; and cultural, historical and aesthetic values.*
- *Continually improving our processes for reducing wastes and emissions to the environment.*
- *Conserving energy and natural resources by maximizing recycling and by-product reuse.*
- *Using the company's environmental management systems to manage the environmental aspects of all timberlands and manufacturing operations.*
- *Adopting internal standards for situations not adequately covered by law or regulation or where we believe more stringent measures are necessary to protect the environment.*

10 Things

You Really Should Know About Weyerhaeuser

1. We planted 132 million trees in 2003, or about 2,400 trees per employee.
2. Wood manufacturing residuals generate nearly two-thirds of our energy, which equivocates to a savings of two barrels of oil for every ton of pulp and paper we produce. Our wood products mills use wood residuals to produce about half their energy.
3. We now use less than half the water to make a ton of pulp or paper, 55 percent less than in 1980.
4. We smell better! Our pulp mills reduced sulfur discharges by 80 percent since 1990.
5. Our safety record has improved by 74 percent since 1993. Sixty-eight percent of our manufacturing facilities posted no lost-time





injuries last year, and 40 percent met a recordable incident rate goal of less than

6 We volunteered more than 175,000 hours. Employees completed 253 WAVE (Weyerhaeuser Active Volunteer Employees) projects in 75 communities. The Weyerhaeuser Foundation gave $12.7 million to worthy causes.

7 We recycled 6.3 million tons of paper. That's enough to fill 126,000 freight cars and require 840 million trips from your garage to the curb. Two-thirds of what we recycle is used in making new paper products. Most of our recycle product is used in packaging papers which have an average recycle content of 40 percent.

8 We mill enough lumber to build homes for 3 million people. And our homebuilding subsidiaries built more than 4,000 homes directly. Pardee Homes constructed a Habitat for Humanity house in a record-setting 50 hours, an hour for every year it has been in business.

9 We make enough corrugated boxes to handle the shipping and storage needs of 55 million people. One of our customers uses our boxes to ship live tropical fish in hundreds of gallons of water, literally swimming their way to pet stores in corrugated boxes!

10 We manufacture more than enough paper to provide every student in North America – from primary to graduate schools – with a full set of text books.

The point of facts 8, 9 and 10 is that Weyerhaeuser is not just an environmental steward. We produce things people truly need for shelter, communication and commerce.

And we do it all with an incredibly versatile resource that is renewable as long as we take good care of the forests ... which brings us back to Fact #1 ... "we planted 132 million trees in 2003, or about 2,400 trees per employee."

Making the Case for High Performance Buildings

Francis Kubier, (Rees and Associates) Oklahoma Organizing Group,

LEED

Ten years ago, the theory of high performance "green" buildings was hard to define and practice even more obscure. All that is rapidly changing. In just three years, 3% of all new construction projects in the United States have registered for certification under the LEED‘ (Leadership in Energy and Environmental Design) Green Building Rating System[1] from the US Green Building Council (USGBC).

From reflective roofs and super-efficient windows to flexible access floors and personal comfort controls, a wealth of new technologies is adding function, value and high performance to today's commercial buildings. Integrated design processes allow project teams to take full advantage of these technologies and at the lowest net cost.

Thanks to LEED and other programs, such as ENERGY STAR“[2], common benchmarks, support tools and opportunities are emerging to offer market differentiation for buildings that create higher private and public value.

Recover Higher First Cost – If Any

Asking if a high performance green building costs more than a conventional alternative is a little like asking which is more expensive, an efficient car or an inefficient one? The answer, of course, is that it depends on factors such as the make and model, features and driving preferences. Many green buildings cost no more to build – or even less than the alternatives – because resource-efficient strategies often allow downsizing of more costly mechanical, electrical and structural systems.

The key is integrated design. The cost of building Johnson Controls LEED Certified Brengel Technology Center in Milwaukee was on par with prevailing construction rates, despite numerous high-tech features like personal comfort systems, multimedia and information tracking systems.

Design for Cost-Effectiveness

A high performance green building is an efficient building. Savings in energy costs of 20 to 50% are common through integrated planning, site orientation, energy-savings technologies, on-site renewable energy-producing technologies, light-reflective materials, natural daylight and ventilation, and downsized HVAC and other equipment.

Building owners realize significant savings during the life of a building through other measures, such as natural landscaping, water-saving equipment, low-maintenance materials, salvaged construction debris and smart building controls. With the help of these kinds of efficiencies, green buildings can save money throughout their life cycle.

Boost Employee Productivity
Few investments generate greater returns than those designed to boost labor productivity. It is easy to see why, based on a comparison of relative operating costs for commercial business. A modest investment in soft features, such as access to pleasant views, increased daylight, fresh air and personal environment controls, can quickly translate into significant bottom-line savings for an employer.

Does available research identify the cause and effect for many specialized design features? Not yet. But emerging data are compelling, prompting new lines of research across the country. We can already conclude that owners and occupants alike are finding that high performance green buildings provide higher-quality work environments.

Enhance Health and Well-Being
High performance green buildings typically offer healthier and more satisfying work environments for tenants. A new survey of laboratory and field research suggests rich opportunities ahead for owners and occupants alike to better understand and take advantage of various green building features to enhance worker well being and performance.[3] No wonder businesses are beginning to use high performance buildings as a potent tool for recruiting and retaining the best employees.

Reduce Liability
Clean and healthy buildings can also reduce legal claims and liabilities for the owners. With the recent explosion in mold-related claims, insurance companies have begun to take defensive action with mold exclusion clauses and rate hikes. Some industry experts are even predicting that insurance companies will start linking lower premiums to high performance buildings.[4]

Create Value for Tenants
High performance features translate into high value for tenants. For example, the annual rate of employee relocation within a building, or churn, averages 25% for most commercial spaces. At an average cost of $2,500, this quickly becomes costly and disruptive. Flexible design features common to integrated green buildings can cut churn costs by 90%

Features designed to cut energy and water bills help attract tenants to the property and increase the likelihood of continued occupancy.

According to the EPA, a tenant can save approximately $0.50 per square foot per year through no-cost management and operations strategies that cut energy use by 30 percent. The tenant's accumulated savings can represent $50,000 or more in a five-year lease of 20,000 square feet of office space. Savings can be even higher when incorporating a variety of high performance and flexible building design components.

Increase Property Value
An asset that maintains its value through higher occupancy and easier maintenance is easier to sell and may command a higher market valuation. There is growing confidence in the industry that a high performance green building can either capture lease premiums or present a more competitive property in an otherwise tough market. Reduce operating costs also generate increase cash flow, which helps capital for other investments. As green buildings are increasingly recognized by LEED and ENERGY STAR programs, the marketplace is expected to follow with am system of preferential pricing.

Take Advantage of Incentive Programs
With the increase in private and public benefits stemming from high performance green buildings, developers are eligible for even greater financial and regulatory incentives. New York, Maryland, Massachusetts and Oregon are on the leading edge of states offering tax credits for LEED Certified buildings. Portland and Seattle offer grants for energy modeling, commissioning and related cost. The private Green Building Loan Fund in Pittsburgh does much the same on a loan basis. Arlington County Virginia, links preferred zoning

considerations for LEED projects. Santa Barbara and Scottsdale are some of the first jurisdictions to offer expedited permit reviews for buildings with certain high performance features. Meanwhile the Kresge Foundation, provider of $120 million in challenge grants for capital projects in 2000, is launching in its portfolio an initiative to support design, planning and educational assistance for LEED Certified buildings.

Benefit Your Community

One of the proven advantages of building green is market differentiation – for buildings, services and products. Many companies also want to demonstrate their commitment to initiatives that simultaneously benefit the environment, community and bottom line. A high performance green building is one of the most tangible expressions of that commitment and an extremely effective tool for educating tenants, employees and shareholders about corporate values and sustainability.

Properties that take advantage of brown field and other infill redevelopment, while offering proximity to mass transit, walking, biking and shopping/daycare services, have an automatic advantage in the race to attract top talent. They offer value to communities by reducing congestion and pollution from automobiles, by providing financial support to local transit systems and by fostering stronger neighborhoods through the creation of public spaces for civic events. In fact, many high performance buildings and their companies are welcomed as good neighbors for just these reasons.

Achieve More Predictable Results

Some of life's surprises may be pleasant – but not necessarily those encountered during the design and construction process. Green buildings design and construction emphasizes "best of class" practices that reduce project uncertainly and risk, and enhance the final product for the customer. Green building emphasizes proven design and decision-making processes such as an interactive design, life cycle and value analysis, and energy modeling. These tools focus on the needs of the specific buildings and site.

Use of green building design and construction techniques improves the certainty of project teams, minimizing surprises that can lead to costly errors and ensuring delivery of buildings that perform as promised.

End Notes

1. The USGBC's LEED is a voluntary, consensus-based national standard to support and validate successful green building design, construction and operations. LEED offers third-party certification of qualifying buildings, high performance design guidelines, and professional training and accreditation services.

2. The federal ENERGY STAR program is a voluntary partnership among business, government and others to help organizations recognize and promote the financial value of top-performing energy-efficient products and buildings.

3. Judith Heerwagon, "Sustainable Design Can Be an Asset to the Bottom Line, *Environmental Design and Construction*, July-August 2002.

4. David Kozlowski, "Can Green Be Gold? *Building Operating Management*, September 2001.

Sustainability: Good Business and Good Sense

J.J. Mulva, President & CEO, ConocoPhillips

ConocoPhillips is an international, integrated energy company. We are the third-largest integrated energy company in the United States and the largest refiner in the country. Worldwide, we are the eighth-largest publicly owned energy company. ConocoPhillips is known worldwide for its technological expertise in deep-water exploration and production, reservoir management and exploitation, 3-D seismic technology, petroleum coke upgrading and sulfur removal. Headquartered in Houston, Texas, ConocoPhillips operates in more than 40 countries. The company has approximately 56,000 employees worldwide and assets of more than $80 billion. ConocoPhillips stock is listed on the New York Stock Exchange under the symbol "COP."

Global Business – Global Responsibility

Today's society has high expectations of the contribution private enterprise can make toward addressing global issues.

The environment we operate in as a company makes committing to sustainable development an essential strategy for ConocoPhillips. Our planning horizon of 30-40 years spans generations, requiring a long-term outlook. We operate in many locations that are politically sensitive, environmentally fragile, and experiencing social turmoil.

As a multi-national corporation, we share the interest of local communities and the global public that we not only deliver strong financial performance but also contribute toward social and environmental progress.

"For ConocoPhillips, sustainable development is about our commitment to conduct our business to promote economic growth, a healthy environment and vibrant communities, now and into the future". J.J. Mulva, President & CEO

Environment

ConocoPhillips is committed to protecting the environment. Each year, the company provides leadership and support for numerous wildlife habitat projects, especially those enhancing avian habitats.

ConocoPhillips FlyWay: For several decades, the company's focus has been on preserving and protecting the habitats of birds all over the world. From the Sutton Avian Research Center in Bartlesville, Oklahoma, to crane breeding grounds in Russia and China, ConocoPhillips takes an active role in protecting and preserving the delicate balance of nature worldwide.

International Friendship Forest: Opened in October 2003, the International Friendship Forest is a restoration of a natural forest at the foot of the Great Wall of China at the Badaling gate. The first of its kind in China, the 40-acre monument will serve as a model of ecological restoration for China's national parks and prominent cultural sites.

Double-Hulled Tankers: With double hulls and other state-of-the-art environmental and safety features, the Endeavour Class is the most advanced class of tanker transportation.

St. Andrews Prize: ConocoPhillips sponsors the annual prize in conjunction with the University of St. Andrews, Scotland, a world leader in environmental studies.

On-site Disposal & Footprints: In Alaska, ConocoPhillips supports an ongoing program that identifies and locates abandoned oil drums using global positioning satellite technology. ConocoPhillips' Alpine field in Alaska is recognized as a model for future North Slope developments because of its "near zero-impact" policy: all waste generated is reused, recycled or properly disposed. The "footprint," or the amount of land area required for production facilities, occupies only 97 acres.

Tallgrass Prairie Preserve: ConocoPhillips supports The Nature Conservancy's efforts to restore the 38,000-acre Tallgrass Prairie in northeast Oklahoma. Originally spanning portions of 14 states and covering over 142 million acres, the tallgrass prairie was one of North America's major ecosystems. Today, less than 10 percent of the original tallgrass prairie remains. Large, unbroken tracts of tallgrass prairie now exist only in the Flint Hills of Oklahoma and Kansas.

Sustainable Development

Our Position

We believe that this approach to business will enable us to deliver long-term value and satisfaction to our shareholders and our stakeholders. Sustainable development is fully aligned with our purpose "to use our pioneering spirit to responsibly deliver energy to the world," and helps translate our core values"– Safety, People, Integrity, Responsibility, Innovation and Teamwork (SPIRIT)— into action.

Our Commitments

- Increase the availability of ever-cleaner energy
- Be transparent and accountable by measuring and reporting both our financial and non-financial performance
- Operate to the highest safety standard
- Positively impact communities wherever we operate
- Minimize the environmental impact of our operations
- Invest in the well-being and development of our employees
- Constantly improve the energy and material efficiency of our operations
- Practice and uphold the highest ethical standard
- Ensure the long-term financial viability of the company

Our Approach

To deliver on these commitments, we will prioritize issues, establish plans for action with clear goals, and monitor our performance. In addition, we will develop the following company-wide competencies to successfully promote sustainable development:

Integration - Clearly and completely integrate economic, social and environmental considerations into strategic planning, decision-making and operating processes.

Stakeholder Engagement - Engage our stakeholders to understand their diverse and evolving expectations and incorporate that understanding into our strategies.

Life-Cycle Management - Manage the full life-cycle impacts of our operations, assets, and products, utilizing such processes as front-end loading, staged decision analysis, and product stewardship.

Knowledge Management - Share our successes and failures to learn from our experiences.
Innovation - Create a culture that brings new, innovative thinking to the challenges of our evolving business environment.

Our Expectations
Through delivering on our commitments to sustainable development we will be the best company to invest in, to work for, to partner with, to have as a supplier, and to have as a neighbor.
From J.J. Mulva, President & CEO

"For ConocoPhillips, sustainable development is about our commitment to conduct our business to promote economic growth, a healthy environment and vibrant communities, now and into the future. ConocoPhillips' core values of SPIRIT – Safety, People, Integrity, Responsibility, Innovation and Teamwork – reinforce this commitment.

I believe this makes good sense for our company and for society in general. We live and operate in a world of needs and demands. The world needs more energy, more economic growth and more opportunity for development. Yet the world demands that these needs are not filled at the expense of the environmental and social systems we depend on for survival.

For our company, sustainable development provides a strong, pragmatic business model for addressing the needs and demands of society – advancing the growth of our company while improving living standards and enhancing environmental and social conditions.

ConocoPhillips believes in personal accountability. To implement these positions, we will prioritize issues, establish plans for action with clear goals and monitor our performance."

Poultry and Pork Agri-Business: Oklahoma's Two White Meats

Anita Poole, Assistant to the President/Legal Counsel, Kerr Center for Sustainable Agriculture

The diversity of Oklahomans' farming systems, while presenting unique and challenging political issues, has the essential ingredients for achieving sustainability over future decades. For a more sustainable agricultural system, the state must develop: favorable public policies that ensure wise use of natural resources; favorable institutional support; and farmers having access to research that allows transition to sustainable systems of production. Equally important is an informed consumer base that is willing to support the idea of ensuring that farming systems will remain productive with equitable returns throughout time.

What is the definition of sustainable farming systems? Sustainability is a long-term concept that forces farmers to think beyond the current harvest to harvests of the future. It is essential that farmers be able to sustain the production of current yields into the future. Several approaches include the development of new crop varieties, improved animal genetics, and more efficient technologies that will help keep yields high. But then, in the quest for higher yields, will the quantity and quality of soil and water be depleted? If microbial life in the soil is destroyed and the soil is depleted, farmers may not be able to depend upon technology to reverse losses. These issues must be addressed in order to maintain productive systems.

Sustainable agricultural systems are those that provide for the needs of the present without jeopardizing the ability of future generations to meet their own needs. Wise farmers have always tried to leave their farms more productive than when they started. In the early days of this country, farmers exploited land by allowing excess erosion and nutrient removal. They had the luxury to move west to new land. Older Oklahomans have termed this process "cottoning out land" or "farming out land." Now there is little new land, and farmers must determine how to manage farming systems to remain productive in perpetuity.

<u>This is the essence of sustainable agriculture.</u>

A sustainable agriculture incorporates new technologies that contribute to keeping farmland productive. Sustainable agriculture is applicable to a wide spectrum of farming systems. It embraces modern concepts of best management practices such as Integrated Pest Management and conservation tillage. Sustainable agriculture is not just organic agriculture, as some believe. Organic agriculture is a system of farming that does not use chemical pesticides or herbicides. Sustainable farming may include minimal amounts of chemicals in order to assure farmer profitability. But mostly, sustainable agriculture is a management intensive system of production that attempts to minimize input use by addressing and solving root causes of problems rather than just treating symptoms with conventional systems of today.

Achieving Sustainability

Farming systems, like resources, need to be renewable and regenerative. To simply preserve the current status is worthy, but is not sufficient to maintain productivity. Catastrophes such as 100-year floods require the retention of a reserve. In this sense, farmers must always be building soil, cleaning water, increasing habitats for additional biodiversity, and using other management tools that are resource friendly.

Remember, farmers just like any other profession, must be able to make adequate returns to provide for a respectable livelihood. Only after these needs are met will farmers be

willing and able to invest in stewardship of the land. It is in the best interest of the farmer to take care of natural resources; however, good stewardship practices perform a noteworthy service to society. State and federal policies should reflect the mutually beneficial relationship of the farmer providing food at a fair cost, and society paying a fair price that also allows for reinvestment in the farming system and its infrastructure. The market structure that has evolved does not evenly distribute these benefits or responsibilities. Instead, government payments have contributed to the ever-growing size and scale of agriculture, which in turn has led to the decline in the number of farmers and viable rural communities.

Oklahoma agriculture has moved from a system of diverse farms to a system that is increasingly becoming a monoculture. Fields are planted year after year in the same crop, partly in response to government programs and partly because of the lack of alternatives. The rotation of crops is a long-established principle that is not adequately practiced today. It is based on sound ecology. With the advent of industrial animal farming, we have essentially turned away from time honored animal husbandry principals in the production of animals. As a result, the sub therapeutic use of antibiotics to control diseases has become inherent under confinement leading to increasingly resistant organisms. Resistance will escalate as stronger drugs are used. There is a large concern among many about antibiotic resistant organisms in humans as a result of sub therapeutic uses on animals. From an ecological perspective, monoculture and confined animal feeding, when practiced at the extreme, violates the inherent wisdom of nature and the models that nature provides.

Sustainable agriculture offers much hope for the future. It takes advantage of the free services that nature provides, seeks equity for those that work the land, and provides for safeguarding the productivity of the earth. Sustainable farmers are quick to develop new markets that cater to those that want their food produced under different production schemes. Sustainable farmers are apprehensive of government payments, as they tend to dictate farming practices rather than good sense. Sustainable farmers must focus on intensive management and innovative techniques. Farmers using sustainable practices work towards reducing negative environmental impacts for the future. As Oklahoma moves forward, farmers can transition to more sustainable systems without disruption to the food supply.

Poultry & Pork - East and West

Poultry and pork operations in Oklahoma are operated under a structural form of business called vertical integration. The corporate owners are called integrators. Integrators own or control a production process that starts with a chicken or a pig and takes it forward to the consumer's plate. The integrator becomes the producer, middleman, and the distributor. The integrator is able to achieve significant economies of size due to volume and market share.

Names that you might associate with vertically operated companies include Tyson, Smithfield Foods, Pilgrims Pride and Seaboard. These corporations produce pork and poultry under confinement systems called Concentrated Animal Feeding Operations (CAFO's).

The Pork Industry in the West

The wide open spaces, low humidity, attractive environmental regulations and availability of groundwater spawned additional interest in diversifying the economy from primarily wheat and beef finishing to swine Concentrated Animal Feeding Operations.

Oklahoma's anti-corporate farming law adopted in 1971 was not favorable to the establishment of swine CAFO's. However, in 1991, the Oklahoma legislature created an exception for corporations engaged in feeding livestock and poultry. Now under the law, it is possible to permit swine operations, feed mills, and processing facilities. This legislative change, along with minimal environmental regulations, opened the doors to the corporate development of massive CAFO's in western Oklahoma.

Communities desperate for jobs welcomed such corporations. All kinds and forms of incentives were offered to entice corporations to settle in Oklahoma. These incentives have been successful in getting CAFO's on the landscape; however, most communities were not prepared for the problems that occurred. Neither were most small swine operations.

Large corporations built facilities housing thousands of hogs on concrete slotted floors over lagoons. Employment increased when integrators began the construction phase of relocation. Other enterprises closely related to the hog business were spawned. Jobs were created, housing markets boomed, and towns had significant growth during the building phase of the industry. Not long afterwards communities began to feel the stress of too much growth too fast. Depending on who you ask, the outcome of the industrialization of the industry has had many impacts–some unforeseen. Those that oppose such development often cite issues such as air quality, possibility of waste seepage into an underground aquifer, the rapid decline of the aquifer as a result of growing additional irrigated grain, community unrest, and rapid infrastructure demands in communities not prepared for such change. While the numbers of hogs grown in CAFO's increased dramatically, the number of small and medium sized operations declined. Universities devoted sizable public resources to work on waste management for the few large corporations while assistance to smaller family swine operations decreased significantly.

Most of the corporate ownership resides out of the state, and one might argue that profits are removed from the community, flowing to out-of-state shareowners while the community is left with tending to infrastructure needs, waste and odor issues, and a declining water table. Corporate lobbyists continually work to create a favorable regulatory atmosphere for these integrators.

The state must determine whether integrated swine operations lead us to becoming more sustainable. Scientists have looked at the net impact on the communities with diametrically opposed conclusions. All parties can agree that even if the net economic impact is positive, the costs to the community in terms of infrastructure development, quality of life, air pollution, and potential pollution of ground water remain significant issues.

Industrial approaches to the selection of the most important economic traits in livestock have led to a narrowing of the genetic pool. A significant number of the breeds of livestock prevalent on farms in the 60's have virtually disappeared. As breeds vanish, composite breeds emerge that stress one characteristic to the detriment of other traits. It is now necessary to breed animals that can withstand a life on concrete or slats. Fertility rates have declined over the years, as other traits emerged as more important.

Many would contend that this system of production is not sustainable. It is operating in an area that is sparsely populated, therefore most of the labor force is imported. Changes in the ethnicity of the community have been challenging and have placed additional burdens on the infrastructure such as water usage, schools, hospitals, law enforcement and other service providers. Citizens are still concerned that the integrated swine industry may cause pollution to the aquifer. This whole area is a stressed ecosystem with the heavy use of irrigation to support beef finishing and hog CAFO's. While water usage for beef feedlots and swine CAFO's is about 3 percent, the production of livestock feeds via irrigation accounts for about 92 percent of the use. Feeding of livestock in this region can only be temporary phenomena as water levels decrease and energy costs for pumping increase. Water rights are being bought to allow the transfer of water to distant locations in Texas. With limited recharge and the level of the water dropping each year, the damage to the aquifer is a cause for concern.

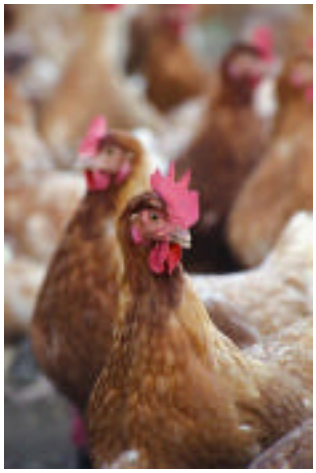
Oklahomans may choose to tighten environmental regulations because of issues surrounding the Ogallala aquifer. If vertically integrated industries face increased costs associated with pumping from the aquifer and complying with stricter regulations, they may choose to locate where restrictions are less and where labor and feed costs are less. As more lawsuits are filed, and the public becomes more aware of problems with confinement feeding, the cost of growing vertically integrated swine may become too high for integrators to continue production within Oklahoma.

However, if the swine industry decides to move elsewhere, communities must be prepared with a plan to revitalize rural economies and repair any environmental harm. Communities will need guidance and assistance to be ready to face the challenges of a changing landscape.

The Poultry Industry in the East

Eastern Oklahoma is an area often dominated by poverty and lack of resources. Farms in the eastern part of the state tend to be smaller in acreage than those in western Oklahoma, but do benefit from more rainfall and temperate weather conditions. Areas along the Arkansas River are excellent for growing many crops such as corn, soybeans, spinach, vegetables, milo and sod. Poultry farms are numerous and offer opportunities for landowners to stay on the farm.

The industrialized poultry production model has been in place for close to 50 years in eastern Oklahoma. Recently, poultry farms have increased dramatically in numbers. Poultry CAFO's are the most industrialized enterprise and present a number of challenging environmental, economic, social and rural development issues.



Poultry barns are often located on marginal land and provide a line of extra income for many farmers already having a difficult time in making "ends meet" on small cow/calf farms. Poultry farmers have historically owned all of the chicken litter produced in their facilities, which for many became a much-needed resource as a fertilizer for pastures. Many have felt that the poultry industry and the eastern Oklahoma beef industry have complimented one another to the benefit of Oklahoma producers.

Several challenges related to the poultry industry have arisen in eastern Oklahoma, including water quality concerns, strains upon infrastructure due to importation of a new workforce, unfair treatment of growers, increased regulation and an increasing rate of poultry related lawsuits.

Concerns about water quality are an issue because of excess nutrient flow into creeks, streams, rivers and lakes when litter has either been over-applied to land or was applied too close to water sources. A poultry industry leader in the Wister Lake watershed recently explained that there is not too much litter produced in the watershed, but there is a distribution problem. Too much litter is being applied repeatedly on the same acreage of land. Plants are unlike humans in that they will not consume more nutrients than they actually need.

Therefore, when more nutrients (i.e. chicken litter) than a pasture will process is applied, the excess washes away in the often-abundant rainfall found in the eastern part of the state. Farmers who apply litter right up to the edge of a water source also risk contaminating the water because litter is usually broadcast through a method that slings the dry matter over several feet at a time. The result of both practices is increased nitrogen and phosphorus levels in the surrounding watershed, which may cause those water resources to become "eutrophic."

Basically, the elevated nutrient levels in the water resources causes an overgrowth of algae and a depleted amount of diffused oxygen which can kill fish and cause a hostile environment for wildlife in addition to increasing water purification costs for drinking water.

Everyone bears the cost of water pollution particularly from what the government considers non-point source pollution. Non-point source pollution is generally anything that does not come from an easily identifiable point source like a pipe, storage ditch, or lagoon. Non-point source pollution is hard to regulate, but it is estimated to cause more degradation to our streams and water supplies than point sources.

Poultry litter is most often considered non-point source pollution, but lawn fertilizers and other run off from urban areas can also be non-point source pollution. In the poultry industry, the integrator, or controlling business, minimizes its risks by giving the growers ownership of the litter in their contract. The integrator realizes a much higher profit than the grower, but the grower is the one who may be liable for any environmental harm that comes from the litter.

To become more sustainable, poultry integrators must work with growers and state agencies to effectively deal with the ecological issues involved in the distribution of poultry litter. Efforts have begun in one watershed, largely in response to a recent settlement agreement in a suit initiated by the city of Tulsa against several poultry companies.

Recommendations and Conclusions

To ensure the sustainability of Oklahoma's agricultural resources, legislators must first recognize the inherent value that agriculture brings to the state's economy. Sustainable solutions include the need for further research, education and outreach, long term planning requirements, comprehensive environmental regulation and enforcement, and economic incentives for best management practices.

Research should focus on sustainable cropping methods, innovative approaches to building soil health, and developing plans for the future. Information gained should quickly be distributed throughout the agricultural community. Institutions should take the lead by providing guidance and assistance in developing technologies that will solve problems and ease transitions in a changing landscape.

In planning for future generations, communities must consider each of the benefits and detriments that new industry brings prior to developing incentive and tax abatement packages that they may later come to regret. Oklahoma communities and new businesses should adopt a "good neighbor policy" when pursing economic growth.

The policy would institutionalize a plan for how communities and companies relate to one another, and would also define mutual expectations with regard to zoning, labor supply, logistics and other critical considerations. Both parties would work together to anticipate and prevent problems from occurring and outline expected remediation efforts.

Oklahoma must zealously defend all of the state's environmental resources and adequately compensate the use of best management practices while enforcing penalties for those who act irresponsibly. The state should support the "polluter pay" principle. With regard to CAFO's, this could be done through bonding to ensure that funds are available for accidents. In many cases, liability of pollution is contracted to farmers. The state should require that corporations be held jointly liable for environmental impacts. Co-permitting is another option.

Institutions should attempt to factor in all costs of production under vertically integrated corporations. Economists must start to address the true cost of certain agricultural practices, even when those costs are difficult to quantify, such as the cost of cleaning up degraded water and impacts of odor on quality of life. Acknowledgment of these costs will lead to appropriate policy changes to ensure that responsible parties incur the associated expenses.

One cannot expect to achieve a sustainable balance overnight; however, everyone should be working together towards that goal. The future depends upon it.

Seaboard Farms: Pork in the Panhandle

Gary Reckrodt, Communications and Public Affairs Manager Seaboard Farms, Inc

The History of Oklahoma and Pork Production
The traditional conflict that sometimes occurs between industry and the environmental movement is not absent from the pork industry. While large scale pork production requires a conscientious focus on the environment, a reasonable balance is required. A state official once referred to the relationship between large scale animal agriculture and the environment as a tradeoff.

Seaboard Farms has never subscribed to this theory. The pork industry and the environment can absolutely exist in harmony.

Issues involving the social aspect of large scale, corporate agriculture often are the hidden agenda behind many who argue these operations "negative environmental impact".

Economics have driven the industry to pursue the economies of scale necessary to maximize, or remain profitable. With this evolution have come the growing pains that traditionally accompany change.

As the picture of agriculture moves farther away from the days when each farmer owned 40 acres and raised crops, chickens, cattle, hogs, etc. there are those that have used the environmental argument as a way to resist this change.

Economic Impact
When Seaboard Farms made the decision in the early 1990's to enter the pork business, and chose the High Plains region, and particularly Guymon, Oklahoma as the central point to these operations, we were for the most part welcomed with open arms. Like much of rural America, the area was experiencing an extended agricultural recession. This was combined with a cooling of the oil boom that had drawn considerable dollars into the region during the previous decades. With plans to build a $120 million processing plant and inject an additional $400 million or more in live production capital assets throughout the region, many saw the coming "hog boom" as a replacement for the dwindling "oil boom".

The city of Guymon passed a referendum with an over 80% positive vote to provide an incentive package for Seaboard Farms to come to Texas County. The vote included selling bonds and raising the city sales tax to repay the bonds. The bonds are currently expected to be repaid well ahead of schedule.

In addition to the immediate economic boost that comes with this sort of investment there is the ongoing activity that lasts indefinitely. Annually Seaboard Farms has a payroll including benefits that exceeds $100 million in the Texas County area. In the past twelve months we have purchased over 40 million bushels of grain from local farmers and elevators. During that same twelve months the company has paid over 36,000 invoices to companies and individuals based in Oklahoma totaling over $102,000,000.

Seaboard Farms currently employs over 3,300 people in Oklahoma and is the largest private employer west of Oklahoma City. Texas County is ranked in the top ten counties in the nation for agricultural receipts. The area was one of the few rural areas in Oklahoma to actually experience population growth according to the most recent census.

Environmental Requirements

The environmental requirements asked of confined animal feeding operations, or CAFO's were negligible in the early 1990's. Since that time new laws have been passed changing the way permits are granted to those hoping to build such a facility in Oklahoma. Seaboard Farms builds facilities with several priorities in mind including long-term sustainability and a symbiotic relationship with the environment. Each facility was constructed for the long term. Facilities constructed in the early 1990's still appear new. Protection of the environment is at the forefront of every facility we build.

The main effect of the new laws regulating CAFO's in Oklahoma has been to politicize the permit process. To simply add additional environmental requirements was not enough. It quickly became clear to opponents that those hoping to build would do so even if it meant implementing processes showing no scientific basis for protecting the environment.

While facilities can be constructed with minimal risk to the environment the permit process in Oklahoma has all but killed the growth of the industry in the state.

"Seaboard Farms currently employs over 3300 people in Oklahoma and is the largest private employer west of Oklahoma City."

Two of our largest farms, located in Beaver County Oklahoma have in place some of the most comprehensive nutrient and waste management systems in our industry. In total, these facilities are home to over 50,000 sows.

The sheer size of these facilities allows for greater resources focused on waste treatment and odor control. Solid separators, de-nitrification, aeration, and composting are just some of the technologies being utilized in this state-of-the-art facility.

Why the High Plains?

With an arid climate, very little surface water, and sparse population, why would Seaboard Farms want to start a half billion dollar industry here?

The answer is – an arid climate, very little surface water, and sparse population, along with the abundance of feedstuffs.

It has been proven that animals perform better in arid climates. The cattle industry learned that decades ago when the bulk of our country's cattle feedlots moved to the region. Seaboard Farms, and most other pork CAFO's utilize a lagoon system of nutrient management, thus the absence of surface water virtually eliminates any chance of surface water contamination.

No one can argue that livestock agriculture comes without an associated odor. The best way to approach the odor issue is to do what is reasonably possible to reduce it, and locate in an area where there will be minimal or no effect on neighbors, thus the benefit of a sparse population.

Seaboard Farms hog facilities are typically located over a mile from the nearest occupied residence, and in many cases severalmiles.Technology continues to show promisein the area of odor control, a major issuein any large scale livestock enterprise.

For each promising idea there are fifty "snake oil" solutions. Each idea must bethoroughly researched and tested beforeput into practice. The process is not aone-size-fits-all. Each so called remedymay show promise at one site and not atanother.

Nevertheless, Seaboard Farms is committed to continuing work onreducing odor at our farms and progress is being made each day.

The Ogallala (Aquifer)
While a wet year might mean a total of 20 inches of rain, the High Plains are blessed with one of the country's largest aquifers, the Ogallala. This underground lake stretches from Nebraska south intothe panhandle of Texas. While there has been considerable discussion regarding the possible depletion of this valuable resource, it remains the main economic driver behind agriculture in the region.

> ***"While facilities can be constructed with minimal risk to the environment the permit process in Oklahoma has all but killed the growth of the industry in the state."***

Water is pumped from the Ogallala and used for irrigation of crops. Currently over 95% of the water pumped from the aquifer is used for irrigation. Theremaining 5% is used by humans and animals.

From an environmental standpoint the depth to groundwater lends added security. Lagoon systems are required to have a minimum of 18 inches of clayliner in the base of each lagoon. Many of Seaboard Farms' lagoons have gone a step beyond this requirement and added a synthetic liner. Thus, it is virtuallyassured that there is no chance of any hog effluent leaching to the groundwater.

Sustainable System
While the cost of bringing water to the surface has increased over the years, Seaboard Farms has found an opportunity for cooperation. The majority of these costs are for naturalgas used to run the large pumps pulling water from sometimes hundreds of feet below the surface. Besides the cost of bringing the water up, the farmer would also add commercial fertilizer to his crop. The cost of natural gas and fertilizer are typically the highest cost inputs in a crop of corn on the High Plains.

When a hog facility is constructed wells are drilled to supply water for the animals. The animals drink the waterand effluent is drained into lagoons neareach facility. This water has now been enriched with valuable fertilizer. The effluent is then given to farmers who now have water and fertilizer to use ontheir crop. The crops are then grown and sold back to Seaboard Farms to be used as feed for livestock. Soil tests and lagoon samples are regularly taken to ensure there is no over-application of nutrients.

The process of utilizing local crops tocreate a high quality porkproduct is a perfect example of"value-added" agriculture. Simply exporting the grain grown locally tousers in other areas of the country or theworld would not create the economic generator that the livestock system creates. Seaboard Farms is a leading exporter of pork products to Japan, Mexico, and South Korea, three of the largest markets for U.S. pork.

By exporting pork rather than grain, the process is able to create significant economic advantages for Oklahoma.

The Seaboard Future?
Seaboard Farms has no plans for additional expansion in Oklahoma. Limited growth is still occurring in Kansas, and there has been discussion as to possible growth in Texas. As the third largest pork producer in North America, and the sixth largest pork processor, Seaboard Farms is recognizeda s one of the major players in the industry. Our parent company, Seaboard Corporation has the resources available to act on opportunities to grow when economic conditions warrant.

The traditional conflict between our industry and the environmental movement is not likely to go away soon. As long as sound science is the basis forour discussions, we are always ready to take our seat at the table. Emotion is a powerful tool, and used inappropriately can cause significant and long lasting damage to an area's economic well-being. Seaboard Farms is committed to the protection of the environment and to providing opportunities for ouremployees and the public in the areas inwhich we operate. We are truly "Invested in Oklahoma".

Oklahoma Agricuture - A Major Conributor to a Responsible Balance

Terry Detrick, Vice President, Oklahoma Farmers Union

Webster defines "environment" as "the circumstances, objects or conditions by which one is surrounded," and""the aggregate of social and cultural conditions that influence the life of an individual or community."

Because man's food, shelter and clothing mostly come from Agriculture, and because it is the affordability and availability of these that determine our quality of life to a large extent, we must then acknowledge that Agriculture is a very important part of "A Responsible Balance." We begin to realize this even more so when we realize how delicate the balance becomes to combine the conservation of our natural resources and good management practices and technology, while sustaining the land we depend upon as the "natural factory" to enhance smart growth.

Another major component affecting our Quality of Life (QOL) is energy. Consumers of energy are usually not located where the energy source exists, so its delivery is crucial and very much dependent upon our rural infrastructure. Additionally, the future promises more dependency on agricultural bio-based renewable resources to satisfy our energy thirst, at affordable prices.

Economically, Agriculture contributes $7.1 billion annually, (8.6 percent of the state's gross production) to Oklahoma's economy. One out of every 7+ jobs available in Oklahoma is attributed to Agriculture. With nearly 80 percent of the state's land mass in farms and ranches, much of our culture is rooted in a community with an agriculture production heritage, constituting a good neighbor dependency culture all its own. *

Twenty percent of our state is covered in forestland, accounting for $1.5 billion in total gross production. Oklahoma ranks third in U. S. wheat production, second in horse numbers, third in beef cow numbers, fifth in cattle and calf inventory, eighth in swine inventory, sixth in pecan and peanut production, tenth in hay and watermelon production and fifteenth in poultry production.

Oklahoma's prorated share of U.S. ag exports was $540 million in 2002.

With the latest technological developments in farm implements, production practices and with biotechnology in crops, the future of Agriculture in Oklahoma is limited only by our imagination.

Oklahoma Agriculture can put our state in an enviable and influential position nationally; if we will seize the opportunities for the future that are ours. A recent in-depth feasibility study shows Oklahoma has tremendous latitude in ethanol production. (Let's tell Iraq we're growing our own!) Much promise is also held in bio-based resources, such as bio-diesel and plastics manufactured from renewable crops. Biotech soybeans, corn, canola and milo that can withstand Oklahoma drought and summer heat are being engineered for alternative energy, plastics and pharmaceuticals.

The wheat we grow in Oklahoma has qualities that are in big demand south of the border and around the world. Mexico has a potential market of 110 million bushels. Oklahoma's average production is

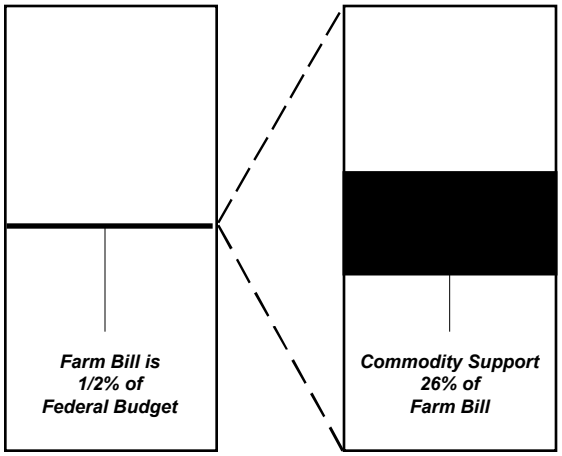
150 million bushels ($510 Million @ $3.40 per bu.). Kingfisher, Oklahoma is considered the 'buckle of the wheat belt'. 95% of the wheat in a 30 mile radius from there goes to Mexico through their 100 car, unit train load-out facility. At least 80 percent of our state's wheat crop is exported out of the state, with 50 percent of the state's crop being exported out of the country.

Value-added business opportunities must be encouraged in this state. Adding value offers entrepreneurial advantages that should be ours, with opportunities to retain both our human and natural resources.

Recently, Fidel Castro personally told a visiting Oklahoman on an agriculture trade mission that if he had been smart enough to have a farm program like the U. S., his people would not be hungry today. A direct trade policy that includes financing capabilities for Cuba to purchase food products from the U.S. would greatly enhance Oklahoma's economy.

The Food Security & Rural Investment Act of 2002, (FSRIA) our current farm policy, costs only one half of one percent of the entire federal budget. What does that cost each U. S. taxpayer? Is it a cost or an investment? Is it the full $180 billion reported cynically by the press?

Is This REALLY a Farm Bill?
(26% of 1/2%?)



The real truth is:

- 55% goes for food stamps, school lunch programs, Women, Infants and Children (WIC), and other welfare programs
- 8.5% goes for conservation purposes, most of which require matching dollars from the landowner (farmers) and seldom increases a farmer's profit, but it does improve the quality of water for the people downstream, the air quality for people in neighboring towns, and preserves the natural resources for future generations as well as helping prevent flooding and property loss
- 7.7% goes for insurance programs to guard against natural disasters
- 1.1% goes for Trade/(foreign) Food Aid
- 1.2% goes to enhance forestry, lumber/housing industry
- .3% for Agricultural Research (much for food safety and enhancement)
- .3% for Rural Development (largely job enhancement and housing)
- .06% for other programs/agencies

This leaves 25.6% of the total FSRIA pie as the farmers' share for commodity price supports, providing a safety net for creditors, landlords, input suppliers and payments on assets. Much of the time these assets are more of a liability than an indication of wealth.

What is the benefit to the American consumer and society in general from this 25% investment in U. S. Agriculture producers? Compare, on average, U. S. consumers spending only 10 percent of their spendable income for food to Mexico's 35 percent and Argentina and Brazil's 30 percent.

In addition to being the most affordable, America's food is also the safest, most abundant and best variety anywhere in the world.

Brazil, by the way, is the fifth largest country in the world and the third largest in the western hemisphere. It has the tenth largest economy and modest average per capita income. In many other parts of the world, seeking food, shelter and clothing just to survive occupies most of the people's time and talent. What priority do they have to contribute to their environment?

If we in the U. S. were to triple the cost of our food, can you imagine the negative economic/ multiplier effect it would have on our QOL (multiple cars, vacations, convenience appliances and other life-style amenities) and the overall environment, both physical and economical?

U. S. Farm Policy contributes greatly to our national independence. Internationally, U.S. producers compete in a global marketplace, governed by trade agreements costing U.S. exporters an average tariff of 64 percent, while importers pay an average of only 12 percent.

What part does Agriculture play in "A Responsible Balance," as we involve human behavior, impacts, natural systems, goods and services, QOL, political demand, development policies and policy compliance?

EVERY PART!

Culture:

- Our very life-styles in general are affected more by what the Agricultural sector provides than any other single sector of our society.

Economy:

- 12 % of our national GDP – 1 out of every 8 jobs
- 8.6% of our Oklahoma GDP – 1 out of every 8 jobs (257,603 jobs)
- $7.1 billion annually to the state's economy

Institutions:

- Financial institutions in communities all around the state of Oklahoma are highly dependent on a successful Agriculture industry
- Agricultural ad valorem taxes are the foundation of and still are a major contributor to the educational infrastructure we know today.
- In a vast majority of our counties, the institution of county government is dependent upon rural Oklahoma ad valorem taxes.
- All institutions have learned the value of the superior work ethics of young rural Oklahomans.

Environment:

- Most production agriculture is performed by third, fourth, fifth, sixth or higher generations of the same family on the same land. Farmers eat their own food, drink their own water, breathe their own air, nurture their children and leave their land for the next generation with one goal in mind:

"Leave this natural resource better than you found it." Long before natural resource preservation and the environment became a popular societal target, agriculture producers were the premier caretakers and protectors of it.

Our country did not achieve greatness with inferior housing, insufficient clothing or empty stomachs! "If you eat, you're involved in Agriculture and the Environment!"

Valuing Natural Resources

Tom Lucas, Resource Conservation & Development Coordinator,
USDA Natural Resources Conservation Service

Valuing Oklahoma's vast natural resources is a complex issue and it may be well to begin by briefly looking at history. One normally thinks of natural resources as land, wood, water, oil, gas, and people. To many Oklahomans, natural resources implies proper utilization and conservation. That is understandable since Oklahoma has set the national agenda for conservation on the land for the last half century following the Dust Bowl. With Oklahoma now on the edge of economic recovery, it may be time to examine our natural resource assets and determine how to value them so that they may be properly utilized to assist in economic recovery efforts while providing long term sustainability for our citizens. Accepted methods for valuing certain resources already exist, for example, oil and gas production and reserves.

We know how many acres of land that we have, what it is capable of producing, and what has been the value of that production. Much is also known about water and its value, but the debate about its long term use and conservation must be settled. Other natural resources are harder to identify, define, and value. Perhaps, the identification and inventory of those resources and the corresponding values which are assigned to them may end up being what they are worth to society in their utilization for sustainable development.

Oklahoma has lost manufacturing and other jobs in the last three years. Many rural areas are experiencing an exodus of people that could be likened to a second "Grapes of Wrath". Except for Oklahoma City and Tulsa, Oklahoma is relatively unscathed as we see the unfolding of the second settling of the West occurring in Colorado, New Mexico, and beyond, changing the culture, values, population, and landscape, just as the first settling of the West did over 150 years ago. Last year, the State lost a clothing manufacturer and about 900 jobs in east central Oklahoma for reasons related to the economy. Realistically, it could be expected that, at some point in time, we might lose another manufacturer. Why? They were not tied to the natural resources base of the community where they were located. Had there been a cotton mill across the road, supplying their material from Oklahoma grown cotton, it might have been another story….

Conservation programs have changed the face of rural America, however they have sometimes affected surrounding communities in different ways. Take the Conservation Reserve Program (CRP) for example, remembering that most government programs require trade-offs, both from society and from individuals. If those trade-offs are significantly negative to a community in general, then sometimes additional assistance may be required in order to balance responsible natural resource protection and small community sustainability, without creating a concern over protecting the environment at the expense of small town economic prosperity.

The CRP provided government payments to producers for returning marginal crop lands to grass. In communities where there were large acreages of CRP, fertilizer, feed, seed, machinery, repair, and fuel businesses began to suffer as these purchases were no longer needed from them for crop production. However, many financially strapped producers were helped by enrollment in the program because it reduced their risk and lowered their expenses. Producers no longer spend $70 million in production expenses annually, but it has been replaced with $33 million in conservation payments. CRP has opened the door for landowners to lease hunting rights because of the excellent wildlife habitat created by CRP, adding at least $5 million annually to their income. At the outset of the CRP, not many planners anticipated

that one of the trade-offs might include business losses in their communities, however, in response, rural development leaders and government officials have intensified rural development rebuilding efforts, but those efforts have been less than what is required.

It must be more clearly realized that the farms and the communities are interdependent and focusing only on the farm will cause the community to lose ground and finally affect the farm as well. In recognition of this, NRCS has moved in the direction of civic environmentalism, which is a new style of environmental policy that focuses on locally led conservation decision making involving the community and utilizing federal and state funding, rather than regulation from the top. NRCS has also strengthened the Resource Conservation and Development (RC&D) Program.

There are other issues. The current invasion of Eastern Red Cedar (ERC) across 2/3 of Oklahoma's counties is using millions of gallons of water, resulting in our trading water for a woody invasive plant that we do not want. Prescribed burning has now become necessary in many areas as a means of eradication. However, ERC may have market value for a variety of products. Oklahoma has other natural resources that are waiting for development, i.e., untapped bentonite reserves, copper, silica, commercial "fracture" sand…..the list could go on. Unfortunately, not enough is known about the identity, location, and extent of these resources to allow rural development leaders to plan for their utilization for the common good.

The economic future of rural Oklahoma may well lie in the proper use and development of these natural resources….and, it is precisely these resources that must be identified, inventoried, and valued. Even the resources that we know exist that have market value now, such as the ERC, an inventory is needed to assist companies in finding appropriate plant locations. In spite of our lack of identification and inventory, there are some excellent examples of the development of these resources by imaginative free enterprise business people, such as the production of salt by evaporation on the Cimarron River, creating over 30 jobs. Wind energy development is beginning to occur, and recently a cutting edge company determined that native gypsum in certain parts of Oklahoma is of food and medical grade, and built a $11 million dollar plant, hiring 20 new employees at above the prevailing wage. Without increased efforts such as these, developable natural resources only have latent value. When they are developed and put to use, only then will they have true value to Oklahoma and its economy.

At issue is the need to develop economic strength for our State using our natural resources appropriately. "For sustainable economic development to occur in rural Oklahoma, it must be tied to our natural resource base! Further, Oklahoma is losing jobs and business opportunities because we are shipping raw materials from our borders.

We should not allow Oklahoma's raw materials to leave our state's boundaries until we have added value to them.

To do as we are now doing allows others outside of our State to reap the economic benefits that come from adding value to our raw materials. How then do we move from where we are to where we need to be? First, an extensive inventory of our natural resources that are available for commercialization must be conducted. That will involve an allocation of public and private funds. Once it is known what we have and where it is, only then can we attempt a realistic valuation effort that addresses their value now as natural resource asset reserves and their potential value to our economy when developed.

There is no doubt that it is an immense number that may be far greater than we might imagine. The situation we are in and what we need to do is best described in the words of E.F. Schumacher when he said, *"I can't raise the winds that blow, but I can at least put up the sail so that when the wind comes, I can catch it"*.

Sustainable and Diversified Agriculture

Terry Peach, Oklahoma Secretary of Agriculture and Jack Carson,
Oklahoma Department of Agriculture, Food, and Forestry

In production agriculture, no area of interest is gaining more notoriety at this time than sustainable or diversified crops and livestock. Both producers and consumers are exploring ways to increase their options in these practices for a variety of reasons.

From a producer's point of view, reducing input costs and taking advantage of expanding niche markets are attractive methods of increasing income. Consumers on the other hand, often express concern over food safety, environmental issues and a desire to support local economies.

No matter the reason, the Oklahoma Department of Agriculture, Food, and Forestry (ODAFF) is committed to increasing opportunities for people and communities to take full advantage of this increasing demand. Since establishing the Oklahoma Farmers Market Program over 20 years ago, we have seen numerous successes and failures in a variety of sustainable and diversified operations and offer our observations for consideration.

First, we must clarify exactly what we mean by "sustainable" and""diversified" agriculture. One of the most common misconceptions is that""sustainable" has the same meaning as organic. This isn't the case. Most organic farming operations are indeed sustainable but not all sustainable farms are organic. Sustainable operations frequently use small amounts of chemicals that would disqualify them from receiving organic certification through this agency. Diversified agricultural programs we see developing in Oklahoma are simply farming and ranching operations which produce non-traditional products such as fruits and vegetables, organic or free-range meat products, or are developing agritourism businesses in conjunction with production agriculture.

Addressing the environmental impacts or advantages of *any* particular type of agricultural operation must be done on an individual basis. Speaking strictly in general, lower input agriculture with its corresponding higher management requirements can have less potential to impact the environment. On the other hand, even strictly organic operations are not without risk to soil and water quality. Nitrate leaching from legume fields may occur, heavy metals can accumulate in soils from certain organic fungicides, and ammonia can volatize to the air from livestock manures.

Proper management and attention to the well being of natural resources is equally important to everyone involved in agriculture whether their operation is commercial, sustainable, or diversified. Further, we believe all of these operations complement our state's agricultural industry and contribute to the goals we seek which include:

- More people making a successful and prosperous living by producing food while protecting the environment.
- Thriving rural communities with economies based on natural resources, agriculture and complementary processing and distribution systems.
- A safe, secure and abundant food supply. (World population is estimated to grow to nearly 9 billion by 2030. Food demand will be three times our current production.)

As more sustainable and diversified operations have gone into production in recent years, farmer interest has increased. Low prices for many traditional commodities along with increasing

input costs are encouraging producers to pursue non-traditional crops and practices. One primary impediment producers face is that launching these programs can be costly and without successful examples to follow, they are reluctant to initiate new sustainable or diversified projects.

The prevailing attitude is, "Before I commit to change and invest in a new way of farming, show me it will work." Producers have seen too many new projects fail. Jerusalem artichokes and ratites are two examples of non-traditional commodities that did not live up to their promoters' promises.

Examples of successful farms in a specific area resulting in the establishment of similar operations are common in areas where a local winery has been built. The winery creates a demand for wine grapes and local producers are able to study viticulture firsthand. In turn, other growers and businesses in the area that offers products directly to consumers benefit from increased traffic from winery customers and other visitors.

Another example is located in the Hinton area where a successful vegetable growing venture begun in the 1980s has helped spawn even more vegetable farms. This area is now the largest seedless watermelon growing area in the state and ships watermelons worldwide.

These two examples, and virtually all successful sustainable and diversified programs we have observed in the state, have had three things in common:

- All have used locally adapted resource-conserving technologies and practices.
- All have benefited from coordinated action by groups or their community at the local level.
- Support has been provided by non-local government and/or private institutions working in partnership with the people involved

Another impediment to expansion of diversified production is the lack of slaughter and processing facilities for specialty meat and poultry products. Federal regulations currently prevent the interstate shipment of meat products from plants not inspected under a federal grant of inspection. Most small plants do not have the resources to fulfill the requirements of obtaining federal inspection. ODAFF licensed plants meet or exceed all federal requirements but products from these facilities are still not allowed to be shipped out of state.

ODAFF, joined by all other state departments of agriculture throughout the nation, has campaigned for USDA to revise its policy and allow state inspected meat plants to have the same trade privileges as their federal counterparts. Our inspection staff receives training that is equal to that of their federal counterparts and our level of food safety protection is equal to or better than that of federally inspected plants. Clearly, USDA needs to revise its policies in the area of meat inspection.

We are also working closely with Oklahoma State University toward the opening of a poultry processing facility that will be able to process chickens for small growers. We believe this would be an ideal arrangement for our organic and free-range poultry producers.

More input, research, and extension efforts are going to be needed from our land grant universities in the areas of sustainable and diversified agriculture. As stated above, one of the greatest impediments to the establishment of these types of farms are the lack of localized example farms or projects for farmers to study and emulate. Localized test plots and assistance from land grant universities stationed locally would help in this area.

Continued funding of the Oklahoma Agricultural Enhancement and Diversification program will also be necessary for growth in non-traditional farming and ranching. Grants and interest free loans are available through this program to help establish diversified farming and ranching projects, marketing cooperatives, and other ventures aimed toward creating opportunities for family farmers and ranchers.

Organic and low-input growers would also benefit from some type of incentive program that would make it more economical to transport soil enhancing poultry litter from sensitive areas to regions that could benefit from its judicious application. Certain areas of central and western Oklahoma could be made more productive with carefully applied poultry litter or other livestock manures. Smaller producers would benefit from the additional organic fertilizer and eastern state watersheds would receive more protection from excess nutrients.

It's clear our producers have the desire to improve their lives through sustainability and diversification. It's equally obvious that demand for the products they can produce is good.

Sustainable Agriculture at Oklahoma State University

Ross O. Love, PhD, Assistant Director, Oklahoma Cooperative Extension Service, Oklahoma State University

The collaborating institutions, Oklahoma State University and Langston University, are committed to the sustainability of agriculture through economic viability, sound environmental and natural resource management, and awareness and recognition of social acceptability. The Oklahoma Cooperative Extension Service provides technical information and educational programs designed to help Oklahoma agricultural producers as they implement strategies and practices to improve the sustainability of their agricultural operations.

Much of the technical information is derived from research-based knowledge generated by the Oklahoma Agricultural Experiment Station at Oklahoma State University and the Langston University Research Program, as well as, through the Land Grant University network around the country. These institutions employ a myriad of means to promote the sustainability of agriculture including: basic and applied research projects, training for cooperative extension field staff and personnel from many of the agencies and non governmental entities working with agricultural producers, educational programs and demonstrations for producers, written information, one-on-one producer assistance, business development and planning, pilot plant operations, and much more.

The Oklahoma Sustainable Agriculture Program closely cooperates with several broad-based sustainable agriculture programs such as the Southern Region and National Sustainable Agriculture Research and Extension (SARE) programs funded by the USDA and EPA, related programs of the Oklahoma Department of Agriculture, Food and Forestry, and the Kerr Center for Sustainable Agriculture. SARE works to increase knowledge about - and help farmers and ranchers adopt - practices that are economically viable, environmentally sound and socially responsible. To advance such knowledge nationwide, Southern Region SARE administers a competitive grants program. The SARE grant program includes research and education grants, professional development grants, producer grants, graduate student awards, and sustainable community grants.

Since 1988, Oklahoma has received $1,825,904 to support 31 projects including eleven research and/ or education projects, seven Extension projects, and eleven producer-led projects and several, a graduate student grant and a community innovation grant. Oklahoma has also received support through several SARE sponsored multi-state projects, as well as, annual professional development grants for training of professionals impacting agriculture.

Sustainable agriculture often means different things to different people. However, most generally agree that it is a paradigm centered on an agricultural production and distribution system that is economically viable for farmers and ranchers, environmentally healthy, and supportive of local communities and rural areas. Goals related to sustainable agriculture often include:

Goal 1. Developing producer skills including knowing and managing markets, adding value to farm and ranch production, optimizing on-farm resource use, and enterprise diversification to help achieve an adequate and dependable farm income

Goal 2. Protecting and renewing soil structure and fertility and the natural resource base

Goal 3. Protecting of water quality on the farm and beyond

Goal 4. Minimizing adverse impacts on health, safety, wildlife, the environment and the community

Goal 5. Achieving the integration of natural biological cycles and controls including managing pests ecologically and with a reduced use of chemical pesticides

Goal 6. Promoting opportunities in family farming and developing sustainable farm and rural communities

The Oklahoma Cooperative Extension Service conducts numerous programs to help agriculture and rural communities to address their sustainability issues. The following paragraphs provide some examples of OCES programs related to the goals listed above. At the end of each program description, a website address is provided.

1

The purpose of the **Food and Agricultural Products Research and Technology Center** (FAPC) is to help develop successful value-added enterprises in Oklahoma. The center will bridge the gap that sometimes exists between academics and the private sector by offering large and small businesses, agricultural producers, and entrepreneurs access to faculty and staff with expertise in business and technical disciplines. The center also offers pilot processing facilities, research laboratories and outstanding educational programs. http://www.fapc.okstate.edu/index.html

Intensive Financial Management and Planning Support (IFMAPS) provides specially trained financial specialists to work one-on-one with Oklahoma farm and ranch families in developing sound financial plans. http://agecon.okstate.edu/ifmaps/index.htm

The **Lane Ag Center** is operated jointly by the Wes Watkins Agricultural Research and Extension Center of Oklahoma State University and the South Central Agricultural Research Laboratory of the United States Department of Agriculture. The Lane Ag Center website contains useful information on watermelon, vegetable, organic production and other crop alternatives in Oklahoma. http://www.lane-ag.org/

Goat research and extension is conducted by the **E (Kika) de la Garza Institute for Goat Research** at Langston University under the Agricultural Research and Extension Program. The primary research thrust is dairy goat nutrition. The scope of the research includes Angora, meat and cashmere goats. Research from the Institute is incorporated into fact sheets and extension educational programs conducted by the Langston goat extension program. http://www2.luresext.edu/goats/index.htm

2

The Oklahoma **Soil, Water, Forage Analytical Laboratory** (SWFAL) was established by the Oklahoma Cooperative Extension Service to provide quality soil, forage and water testing for the state of Oklahoma. Each year over 40,000 samples are analyzed for thousands of farmers, ranchers, homeowners, consultants, government agencies, and researchers. Recommendations are made based on many years' field calibrations conducted in Oklahoma. www.soiltesting.okstate.edu

3

Water Quality Programs - The OCES conducts a broad set of activities in water quality education and technology transfer for agricultural producers, consumers, and communities. http://biosystems.okstate.edu/waterquality/

4

Animal Waste Management Programs - Animal agriculture is a large segment of the economy in Oklahoma. Manure may cause surface and groundwater pollution if mismanaged. Manure can be a valuable asset to a livestock production operation if its nutrients and organic matter are recycled through land application properly. http://www.animalwaste.okstate.edu/ In addition, OCES conducts the Oklahoma Poultry Waste Management Educational program http://biosystems.okstate.edu/animalwaste/poultry/ Also, for information on poultry litter markets and marketing see http://dasnr4.dasnr.okstate.edu/poultry/index.asp

5

Integrated Pest Management (IPM) is a sustainable approach that combines the use of prevention, avoidance, monitoring, and suppression strategies in a way that minimizes economic, health, and environmental risks. The Oklahoma IPM program is a diverse and highly interdisciplinary effort that brings together the expertise needed to provide agricultural producers, consultants, homeowners, and other pest managers with practical answers to pest management. The goal of the IPM program is to increase the implementation of IPM methods by emphasizing environmental responsibility and respect for people's livelihoods. http://www.ento.okstate.edu/IPM/index.html

6

The expansion of the economic base in rural communities is the goal of the **Community Resource and Economic Development** programs, along with providing quality community services at affordable costs. Cooperative Extension offers educational and technical assistance to aid rural leaders in promoting economic development and providing quality community services. The programs include economic and business development, community services, and local government education. http://www.rd.okstate.edu/ The Initiative for the Future of Rural Oklahoma (IFRO) is a new outreach effort to develop community-level and county-level leadership training programs that will directly benefit Oklahomans living in rural communities. http://ifro.okstate.edu/

The programs above highlight just a few of the educational and information activities available to agricultural producers, businesses, and communities relating to sustainable agriculture and sustainable communities. In addition, the Oklahoma Sustainable Agriculture website (http://oksusag.okstate.edu/) provides many of these links as well as links to SARE and other entities addressing sustainability in agriculture. Finally, one of the best sources of local information for agricultural production is the local county Cooperative Extension Center.

institutions

Oklahoma Legislature: The Inside Scoop

Larry Rice, State Representative; and Director of Public Affairs, University of Tulsa

Who We Are

Generally speaking, legislators are reflective of their constituents. Balanced growth between the environment and the economy is viewed differently depending upon your geographical area and the expectations of your constituents.

Majority Floor Leader and Speaker's Leadership Team. Committees: Appropriations and Budget and Subcommittee on Public Safety and Judiciary; Banking and Finance; Energy and Utility Regulation; Judiciary; Revenue and Taxation; and Science and Technology.

For example, would Tulsa really care about Lake Spavinaw if it were not a source of their drinking water? Probably not! I haven't seen much interest by the City of Tulsa in cleaning up and protecting the Illinois River Basin, where industrial, commercial and recreational uses often conflict. Balanced growth, i.e. protection of this watershed, came from a variety of State and local governmental efforts, including the Courts!

Balanced growth in Oklahoma, from my perspective, is an easy one. Having served in the Oklahoma House of Representatives for 18 years, I have witnessed an awakening of legislators and those citizens who elect them. The Legislature is not afraid of the "E" word. Environmental legislation has flourished during the past 18 years. Has business and industry been the victim of this legislation? Not in my opinion.

Let's refresh our memories….

In 1989 one of the earliest and most politically hot potatoes I had been a part of was the passage of the Tire Recycling Fee of $1 per passenger tire on every new tire purchased. Wherever you could purchase a new tire, a large sign was posted indicating the reason for the $1 fee - the OK Legislature! In 1992 the Legislature created the Department of Environmental Quality, DEQ, complete with citizen advisory councils from business and industry - and primacy from EPA!

Once again, in keeping with the desires of those who elect us, we carved out an exemption for oil/gas to continue having environmental oversight provided by the Oklahoma Corporation Commission. All agriculture-related activities would be regulated by the Oklahoma Department of Agriculture. The DEQ, in my opinion, is working quite well — providing that "balance" for environmental protection, job creation and growth. The elected representatives of the people still have oversight of all DEQ rules and regulations, as well as EPA.

OERB

In 1993 two significant events occurred in the environment and business arenas. The Oklahoma Energy Resources Board (OERB) and the Underground Storage Tank Fund were created and passed by the legislature at the request of affected industries. Both of these have received accolades nationally and several states have attempted to emulate them.

CAFO

In 1996 the Legislature took on one of the most heated and passionate topics of debate by wading off into the deep waters of Concentrated Animal Feeding Operations (CAFOs). This effort was temporarily shut down by the Governor's veto of HB 2483. This started in 1991 when state law was amended to allow corporate farming. In 1997 CAFO regulation, including setbacks from residences, was enacted. No balanced growth here. If you were lucky enough to sell or be a part

of the concentrated animal feeding operation you were happy and pro-jobs! If not, you and your neighbors were very much the environmentalists - especially if your residence was located "downwind!" During the 1998 legislative session, after considerable cry and hue from the public, the Legislature passed a one-year moratorium on any new or expanding large animal feeding operation in Oklahoma. This was followed by legislation that significantly modified and strengthened CAFO's rules and regulations as they applied to swine, and repealed the moratorium the same year it passed!

The legislature is not afraid of the "E" word. Environmental legislation has flourished during the past 18 years.

Poultry

In 1998 after the release of a 1997 report of the Grand River Watershed, indicating serious threats of phosphorus overloading, the Legislature created the Oklahoma Registered Poultry Feeding Operations Act. This was the start of a long road to regulate the state's rapidly growing poultry industry. This same Legislature passed a measure to prohibit the Oklahoma Corporation Commission from ordering the plugging of any oil or gas well when the price of Oklahoma sweet crude falls below a certain price for 30 or more consecutive days.

Air

In 1999 the Legislature revised the Oklahoma Clean Air Act by giving DEQ more time (from 180 days to five years) for investigating air quality violations. This was significant to keep DEQ from losing its jurisdiction to the EPA and necessary to keep the "balance" determination on a local level.

Landfills

In the 1997 session, a financial assurance mechanism was enacted for solid waste landfills that were forced to close as a result of a more stringent federal requirement. Many of these were municipal or county owned. In 2000 legislation was passed to establish, for the first time, termiticide applications! We have taken on thistle and boll weevil eradication and lead-based paint.

DEQ now has the authority to issue swimming and fishing advisories for waters of the state that may be hazardous due to bacteria.

In this same session, the Oklahoma Carbon Sequestration Enhancement Act and the advisory committee to advise and assist the OK Conservation Commission was enacted to study the economic impacts of carbon sequestration and opportunities to participate in a system of marketing or trading of carbon dioxide emissions. Carbon sequestration refers to a method of reducing greenhouse gas (carbon) emissions by capturing carbon at its source, in this effort agricultural production and directing the carbon to places where it will not be released into the atmosphere. And most of you thought all we did was regulate chicken and hog effluent!

Selling Water

Water and water rights stared down the Legislative River during the 2000 session with passage of a resolution(s) requiring the OK Water Resources Board (OWRB) to work with the US Army Corps of Engineers and the Choctaw and Chickasaw Nations to formulate a comprehensive Kiamichi River Basin Water Development Plan, which includes the Sardis Reservoir. This plan was to consider lake level and future use of the water from Sardis… i.e. maybe selling water for repayment of construction costs of Sardis?

The importance of water keeping the balance between environment and economy came to the top of the heap during the 2002 Legislative session. The Legislature established a three-year moratorium on the sale or exportation of water outside the state in quantities greater than eight million gallons per month. This was in response to the proposed compact between the State of Oklahoma, the Choctaw Nation and the Chickasaw Nation to sell water from Southeast Oklahoma to the state of Texas. Not!!

However, at the urging of leading citizens, in the name of weather forecasting research and homeland security, this same Legislature diverted $38million from the Petroleum Storage Tank Release Environmental Clean-up Indemnity Fund to a new Higher Education Facilities Revolving Fund for research and technology development.

Tax Credits

Tax Credits to keep the "balance" have always been popular with the Legislature. 2002 was no different — tax credits to Oklahoma manufacturers of advanced small wind turbines were enacted in an effort to encourage the production of alternative energy sources in Oklahoma.

Previous years' tax credits have been extended to the Oklahoma Coal Producers and Oklahoma Coal Purchasers, Oil land Gas gross production incentives, ethanol production facilities, biomedical research institutes and investments in qualified venture capital companies. During the 2003 session, certain Oklahoma refineries were given an ad valorem tax exemption for the value of investment in property for the desulphurization of gasoline or diesel fuel to meet the new federal regulations.

This effort was promptly greeted by the State School Board Association's collection of a monetary donation from virtually every school district in the state for a legal challenge and moratorium of the enactment.

More Water

During the 2002 session water sales out-of-state were the topic of concern. During the 2003 session controversy arose again over the sale of Oklahoma's water, but this time the Legislature waded into the fight of in-state water sales with a moratorium of water sales from sole source aquifers. Grand Lake was back in the "balance" once again with legislation directing the Secretary of Environment to conduct a study of the watershed to identify factors that specifically may impact economic growth and environmental uses of the lake.

Not to be outdone, Governor Henry waded into the "balance" by convincing the Legislature to provide assistance for a voluntary relocation program for families with children under the age of six who live in the Tar Creek Superfund site.

All of this brief history of legislation was regurgitated to support my earlier thesis that Oklahoma's legislators are reflective of their geographical areas and their constituents' demands. Term limits may briefly change and challenge this thesis, since some 36 out of 101 seats will be vacated, plus additional new faces from those who defeat incumbents will be added.

The balance between the environment and the economy has been consistent during my tenure. If the Legislature has shown any "favoritism," in my opinion it has been to agriculture and the oil and gas industries. Why? Usually""ag" means small business owners and""mom and pop" operations. Historically these have been the backbone of Oklahoma's economy —— albeit we all know this has and is changing. They still are a strong factor in our economic base. However, when asked, even demanded, by the public, the Legislature was not afraid to interject environmental regulation and oversight for agriculture and oil/gas enterprises.

I know of no area concerning the balance of the environment and the economy that the Legislature has been shy or reluctant to engage in serious debate.

Indian Sovereignty

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Sovereignty Defined [1]

The supreme, absolute and uncontrollable power by which any independent state is governed; supreme political authority; the supreme will; paramount control of the constitution and frame of government and its administration; the self-sufficient source of political power, from which all specific political powers are derived; the international independence of a state, combined with the right and power of regulating its internal affairs without foreign dictation; also a political society, or state, which is sovereign and independent.

Development of Sovereignty Theories [2]

Though the term "sovereignty" was not in use until the 1300's, theories concerning state power have been around for some time. Popular sovereignty, now widely accepted, has its roots in classical Greece. Citizens often acted as sovereign in a popular assembly or delegated the power to a representative body. Plato accepted the notion of popular sovereignty within his overarching metaphysics, but specified a rigid selection and training process for those who held sovereign power. In an Aristotelian state all the citizens would rule and be ruled in turn, but requirements for citizenship were extremely narrow. Natural law was generally thought to be the only limitation on sovereignty.

The Romans made liberal use of Greek traditions but were forced to change during the Imperium. Under the Imperium s*umma potestas*, supreme authority, was derived from the citizens but wielded by the emperor. The emperor had achieved hegemony among the citizens and thus held the sovereignty derived from them. In keeping with the natural law tradition, the emperor was supposed to work for the good of the citizens.

Medieval conceptions of sovereignty were formed by the ongoing power struggle between church and state. The spiritual and temporal realms were explicitly divided with the church and monarch supreme in their respective domains. Sovereignty was derived from God. The church conveyed God's grant of temporal sovereignty to the monarch, giving the monarch authority to use his power. In return, the monarch recognized various church prerogatives. The church's ability to withdraw sovereign authority from the monarch gave the church a great deal of temporal power. The only recognized limit on sovereignty was the need to obey divine law.

Jean Bodin's model of the state was an idealized synthesis of state structures existing at that time. Though sovereignty was "vested in a commonwealth," the prince was sovereign. Bodin specified a large number of limitations on sovereignty. Among other things, the sovereign must obey natural and divine law; keep oaths to other princes; keep covenants with subjects; and obey constitutional laws regarding the king's estate. Despite these limitations, Bodin repeatedly avowed the absolute supremacy of the sovereign, arguing that such limitations really did not affect the sovereign's power. These arguments hinged on the assumption that the limitation in question could be derived from natural law. It is to Bodin that we owe the clear equation of sovereignty and the state.

Hobbes derived sovereignty from the individual's submission to state authority. He believed that individuals submitted to state authority out of fear. People fear each other in the "state of nature" where the individual's freedoms are not constrained by state control; in a conquered state they fear the conqueror and so on. In each case they submit to the will of some individual or group to reduce their fears. The individual or group submitted to becomes sovereign. Hobbes, like his

predecessors, stressed the absolute nature of state power and authority. The sovereign was limited only by the need to maintain an appropriate balance of fear in which the subject feared the sovereign's rule less than the alternatives.

Rousseau returned sovereign power to the citizenry, but unlike Aristotle he had a much more inclusive view of citizenship, requiring everyone in the state to participate. Sovereignty was derived from the people, who freely and unconditionally put themselves under the direction of the general will as part of a "social contract." The general will was the considered will of the people with respect to the common good. Though the people might submit to a sovereign to escape the depredations of a Hobbesian state of nature or the fear of a conqueror, Rousseau argued that only a submission to the general will could truly work. Since submission to the general will was the best any person could hope for, it had absolute authority. There were no external limitations on the general will since it was necessarily self-limiting: The people would never knowingly will anything contrary to their own good.

Rousseau explicitly differentiated between the physical power and moral authority of the sovereign. "Executive power" was the physical side of sovereignty delegated to government, which was to act only as an agent of the sovereign. The people as sovereign were the moral authority, or""legislative power", under which the government acted.

Though sovereignty continued to be the subject of philosophical theories for decades after Rousseau, the word has almost disappeared from philosophy in recent years. This is because of the ambiguity of the term. Since "sovereignty" denotes both the moral authority by which states wield power as well as the power itself, any discussion using it is prone to confuse might and right. This crucial ambiguity arose for many reasons. The earliest theorists sometimes conflated power and authority.

Later theorists were often more intent on description rather than prescription. The ambiguity has been propagated in part due to its usefulness in justifying otherwise questionable positions. Would be sovereigns have cited their power over others as sovereignty and then cited their sovereignty to claim authority. Such abuses ensure the term's popularity in political discourse, necessitating its continued study by political scientists. It is in political science that we find the most philosophical examinations of sovereignty today.

Even without the troublesome ambiguity, study of sovereignty would have languished because of the tacit acceptance of popular sovereignty limited by human rights. The modern constitutional state assumes this framework and the modern theorist usually works within some version of it. This framework obviates the need to debate sovereignty *per se*, leaving only such questions as how to properly implement popular sovereignty and the nature and extent of the limitations imposed by human rights.

Recent developments ensure a renaissance of sovereignty theories or their cognates. New entities have been created, requiring new theories of sovereignty. The United Nations and European Community are examples of organizations composed of "sovereign states" which may in fact or by agreement limit the sovereignty of their member states. Multinational corporations often have the power to influence or even dictate state policy, while their very existence raises jurisdictional issues.

At the same time that new structures are arising, old ones are breaking down. The vague notion of popular sovereignty has been found lacking because of growing acceptance of multicultural views involving ideas like group rights. Racial, ethnic and other groups are claiming a right to "self-determination" limiting state sovereignty over them, or are even asserting their own sovereignty. These groups usually justify such claims with reference to one or more of the following: Past possession of sovereignty,

commonality of interest within the group and its lack with other groups, distributive injustices, cultural preservation, and self-defense.

Overview of Legal Status

The question, particularly the legal question, of Indian sovereignty is both completely clear and totally confused. It is clear because the fundamental principles of American democracy make recognizing Indian sovereignty a necessity. It is completely unclear because hundreds of laws and court opinions have either ignored or attempted to legally justify a history in which the U.S. steadily stripped Indian nations of most elements of sovereignty while engaging in what can only be called attempted cultural genocide if not outright physical genocide. The false-consciousness of U.S. law with respect to Indians was perhaps best expressed by Justice Marshall in *Johnson v. McIntosh* as he laid out the origin of U.S. title to land once held by Indians,

… Conquest gives a title which the courts of the conqueror cannot deny, whatever the private and speculative opinions of individuals may be, respecting the original justice of the claim which has been successfully asserted...

However extravagant the pretension of converting the discovery of a country into conquest may appear; if it has been asserted in the first instance, and afterwards sustained; if a country has been acquired and held under it; if the property of the great mass of the community originates in it, it becomes the law of the land, and cannot be questioned... However this restriction may be opposed to natural right, and to the usages of civilized nations, yet, if it be indispensable to that system under which the country has been settled, and be adapted to the actual condition of the two people, it may, perhaps, be supported by reason, and certainly cannot be rejected by Courts of justice.[3]

Yet, despite the false-consciousness and the fear of loss of control and wealth, the Government of the United States has been unable to completely ignore the just claims of Indian sovereignty due to its recognition of popular sovereignty.

The United States is founded, in part, on the notion of popular sovereignty. As the *Declaration of Independence* states, "We hold these truths to be self-evident, that all men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness.—That to secure these rights, Governments are instituted among Men, deriving their just powers from the consent of the governed." (emphasis added) The *Constitution of the United States* begins with the words, "We the people…"*"*making clear that the ultimate authority from which the *Constitution* and Government of the United States derives all their powers is the people of the United States.

Indian nations pre-date the United States. Each nation was a recognizable polis, possessing sovereignty unhindered by outside powers. Every treaty between the U.S. and an Indian nation is a recognition that the Indian nation is a sovereign, since treaties are agreements between sovereigns. From the beginning the U.S. recognized Indian sovereignty in dozens of documents. No less a luminary than Thomas Jefferson recognized Indian sovereignty in no uncertain terms "… the Indians had the full, undivided and independent sovereignty as long as they choose to keep it, and that this might be forever."[4] The sovereignty of Indian nations was and is properly derived from Indian people, just as the authority of the United States derives from the people of the United States. Indian people did not consent to be governed by the United States, so they retain their sovereignty.

This simple reasoning, based as it is on the most fundamental precepts of American democracy, has been impossible to deny altogether, though expediency, racism and outright greed allowed it to be ignored over and over for hundreds of years. As the United States has become a more just society, it has realized some of these past injustices and has ensconced in law a recognition of the inherent sovereignty of Indian nations:

Congress, through statutes, treaties, and the exercise of administrative authorities, has recognized the self-determination, self-reliance, and inherent sovereignty of Indian tribes;

Indian tribes possess the inherent authority to establish their own form of government, including tribal justice systems;[5]

Today, the recognition of Indian sovereignty is known as the Doctrine of Inherent and Retained Sovereignty. Indian nations are recognized as being inherently sovereign and as retaining all elements of sovereignty that have not been explicitly taken from them. Their sovereignty is generally recognized as being greater than state sovereignty and not defeasible by a state (though there are some states under P.L. 280 which have civil and criminal jurisdiction in Indian country, Oklahoma is not one of these).

Given the standard definitions of sovereignty, as "absolute and uncontrollable" and the fact that internationally, sovereignty is the prerogative and defining element of the nation-state, it is unclear how the United States can recognize Indian sovereignty and claim any authority over Indian nations. Yet, they not only exercise power over Indian nations in fact, but even claim legal authority to do so. As the Supreme Court "ruled in" *United States v. Wheeler"* (1978), "The sovereignty that the Indian tribes retain is of a unique and limited character. It exists only at the sufferance of Congress and is subject to complete defeasance."[6] This is probably the clearest statement of the conflict between the Plenary Power Doctrine and retained sovereignty ever made, though the origins lie as far back as 1832. [7] Under the Plenary Power Doctrine the U.S. Government, acting through Congress, claims the legal right to complete or "plenary" power over Indian nations even to the extent of the total destruction of Indian sovereignty.

So, today Indian sovereignty is recognized by the Federal Government as inherent in the Indian people, pre-dating the United States, but also completely defeasible by the U.S. Government.

Short History of Indian Sovereignty in the U.S.
Indian sovereignty was untrammeled until the advent of Europeans explorers and colonists. The extent to which the Europeans recognized or were concerned at all with the legal question of Indian sovereignty depended upon a number of factors including: 1) The importance of legalisms in the European country in question 2) The pressure of merchants, settlers and others for Indian land/ wealth 3) The relative power of the Indian nation involved 4) The power of European rivals wanting the same land/wealth.

The potential for war between European powers over New World wealth made a deal essential. The Doctrine of Discovery eventually emerged as the governing legal doctrine for the taking of Indian lands. Under the Doctrine of Discovery, the ultimate title to Indian lands lay in the hands of the European sovereign whose subjects first "discovered" those lands. Discovery gave the European sovereign a pre-emptive right to those lands against all other European nations. The Indian nations in the meantime only had a "title of occupancy" which could be extinguished by the discovering European nation either by purchase or by conquest.[8] This same legal groundwork has been used around the world, including Australia, where the Doctrine of Discovery is called *Terra Nullius*.

The English were among the most legalistic of the European nations claiming land in North America. The English colonies rebelled partly on legal grounds, setting up a republic based on the "rule of law," popular sovereignty and various other important legal and philosophical notions. Because of the importance of law in the new nation that we now know as the United States, Indian nations were immediately the subject of treaties, laws and court cases. Until the early 1800's Indian sovereignty wasn't really questioned. Treaties defined the territorial limits of the Indian nations, but settlers constantly invaded Indian land. The U.S. Government did not have the will to stop the predations of its own citizens to protect Indian people, so it began purchasing Indian land and

paying reparations as necessary. By the 1820's this was so common that some private individuals had taken to purchasing Indian land directly.
The *'Johnson v. McIntosh* Supreme Court case adopted the Doctrine of Discovery, making it clear the United States, not individual citizens, had the pre-emptive right to Indian lands. It also ensured that the title to lands already taken had a firm legal foundation:

The United States then have unequivocally conceded to that great and broad rule by which its civilized inhabitants now hold this country. They hold, and assert in themselves, the title by which it was acquired. They maintain, as all others have maintained, that discovery gave an exclusive right to extinguish the Indian title of occupancy, either by purchase or by conquest...[9]

This case mentions in passing the religious justification for the Doctrine of Discovery as well as the later philosophical justification based on Lockean notions, but ultimately bases the U.S. version of Discovery on conquest (see *Johnson v. McIntosh* quote supra 2-3). Though this was not particularly problematic in the 1800's, today the United States and International Law both assert the injustice of conquest.

With a clearer legal groundwork and increasing pressure from would-be colonists, the United States continued purchase of Indian land. The purchases became more and more coercive as the Indian nations in the east resisted any further land loss. In 1830, the Congress passed the Removal Act, authorizing the executive to negotiate the removal of the eastern tribes to lands west of the Mississippi river. Some tribes resisted legally, particularly the Cherokee. They had been under intense pressure by settlers and the government of Georgia, which attempted to assert jurisdiction over the Cherokee lands. Two cases resulted. The pressure to allow "settlement" of Cherokee lands was so great that the Supreme Court attempted to find an out, rather than have the executive branch fail to enforce the decision. To sidestep the issue in *Cherokee Nation v. Georgia* (1831) the Supreme Court, in a split decision, ruled that Indian nations were not foreign nations. Since the Cherokees, acting as a foreign nation, had brought suit the Supreme Court was the court of original jurisdiction. By denying foreign nation status the Court was able to deny original jurisdiction and dismiss the suit. In doing so, the court called Indian nations "domestic dependent nations," saying in closing, "If it be true that the Cherokee nation have rights, this is not the tribunal in which those rights are to be asserted. If it be true that wrongs have been inflicted, and that still greater wrongs are to be apprehended, this is not the tribunal which can redress the past or prevent the future."[10] Though the Court would not risk ruling in favor of the Cherokeees, it tried mightily to increase the sympathy for Indian nations with a long discussion of the wrongs done to Indians. To further bolster the Indian position, it created the "Trust/Guradianship" relationship.

If Courts were permitted to indulge their sympathies, a case better calculated to excite them can scarcely be imagined. A people once numerous, powerful, and truly independent, found by our ancestors in the quiet and uncontrolled possession of an ample domain, gradually sinking beneath our superior policy, our arts and our arms, have yielded their land by successive treaties, each of which contain a solemn guarantee of the residue, until they retain no more of their formerly extensive territory than is deemed necessary to their comfortable subsistence. To preserve this remnant, the present application is made.

Though the Indians are acknowledged to have an unquestionable, and heretofore, unquestioned right to the lands they occupy, until that right shall be extinguished by a voluntary cession to our government; yet it may well be doubted whether those tribes which reside within the acknowledged boundaries of the United States can, with strict accuracy, be denominated foreign nations. They may, more correctly, perhaps, be denominated domestic dependent nations. They occupy a territory to which we assert a title independent of their will, which must take effect in point of possession when their right of possession ceases.

Meanwhile they are in a state of pupilage. Their relation to the United States resembles that of a ward to his guardian.[11]

It is interesting to note in this ruling that Marshall, again writing for the majority, only speaks of "voluntary cession," completely abandoning his earlier position in *Johnson v. McIntosh* that the cessions could be "by conquest."

The next case, *Worcester v. Georgia* (1832), was clearly in the Supreme Court's jurisdiction. Georgia had imprisoned one of its citizens who had broken a Georgia law within the Cherokee nation. The man sued on the grounds that the laws of Georgia did not extend into the Cherokee nation. The Court finally ruled that the laws of Georgia "can have no force"[12] within the Cherokee nation. However, in doing so, Marshall's majority decision used language that seemed to imply that Congress had Plenary Power over Indian nations, particularly when coupled with the prior guardianship relationship.[13] Nevertheless, Marshall strictly maintained that such relations do not mean that the Cherokees or other Indian nations have surrendered their independence.

… [T]he settled doctrine of the law of nations is, that a weak power does not surrender its independence — its right to self government, by associating with a stronger, and taking its protection. A weak state, in order to provide for its safety, may place itself under the protection of one more powerful, without stripping itself of the right of government and ceasing to be a state…. At the present day, more than one state may be considered as holding its right to self government under the guarantee and protection of one or more allies.[14]

Marshall also wrote forcefully and cogently concerning Indian nations, making it clear that he considered them to be "nation-states" within U.S. law: … The constitution, by declaring treaties already made, as well as those to be made, to be the supreme law of the land, has adopted and sanctioned the previous treaties with the Indian nations, and consequently admits their rank among those powers who are capable of making treaties. The words "treaty" and""nation" are words of our own language, selected in our diplomatic and legislative proceedings, by ourselves, having each a definite and well understood meaning. We have applied them to Indians, as we have applied them to the other nations of the earth. They are applied to all in the same sense.[15]

Despite this seeming victory, the Cherokees were forced to remove. President Jackson used a loophole to keep Worcester imprisoned after when he should have been freed, making it clear that he didn't intend to enforce the decision — while still keeping within the letter of the law. One by one, the main remaining eastern tribes were forced to remove.

The legal status of Indian nations did not materially change again until 1883, despite many other changes, some momentous and some incremental. In a practical sense, the self-government of many Indian nations was gradually worn away by Federal agents in their role as guardian. Tribes that resisted the takeover of land or other dictates of the government were subdued by force and subjected to administration. Despite all this, in *ex Parte Crow Dog* (1883)[16], the Supreme Court ruled that no U.S. laws then current, had force within Indian nations. However, the Court went on to point out that the U.S. guardianship of Indian nations clearly meant that the U.S. could make laws that extended into Indian country. With this ruling as a foundation, Congress passed the Major Crimes Act[17] of 1885. It covered a variety of acts committed by Indians against Indians within Indian country. This is the first statute in which the United States presumed to govern the acts of Indians within Indian country. Just two years after its first extension of jurisdiction into Indian country, Congress passed the General Allotment Act[18] or "Dawes Act." This act was the result of many pressure groups, including some that were supposedly acting for the "benefit" of Indian people. Yet, as the minority report of the House Indian Affairs Committee stated, The real aim of this bill is to get at the Indian lands and open them up for settlement. The

provisions for the apparent benefit of the Indian are but the pretext to get at his lands and occupy them… . If this were done in the name of greed it would be bad enough; but to do it in the name of humanity, and under the cloak of an ardent desire to promote the Indian's welfare by making him like ourselves, whether he will or not, is infinitely worse.[19]

The Dawes Act not only took two-thirds of all remaining Indian land (and about 80% of the total land value), it immediately made any Indian person accepting an allotment a citizen of the United States.

Some tribes escaped allotment because their land was so poor. Others, like those in Oklahoma, were politically astute enough to hold off allotment for a time. One of the first and still probably the best book on allotment is Angie Debo's *And Still the Waters Run*[20] which lays out the process that eventually resulted in Oklahoma's admission as a state of the union. With statehood, the Indian nations of Oklahoma were supposed to cease to exist, just as the individual Indians were supposed to have become citizens when they accepted an allotment. Most of the Indian tribes of Oklahoma had come to their new land specifically to keep from being absorbed politically by the United States. All of them had treaties that they thought would protect them from being taken-over. Some, like that of the Choctaw were incredibly prescient. As early as 1831, the Choctaws had a treaty that required,

ARTICLE 2. The United States under a grant specially to be made by the President of the U. S. shall cause to be conveyed to the Choctaw Nation a tract of country west of the Mississippi River, in fee simple to them and their descendants, to inure to them while they shall exist as a nation and live on it…

ARTICLE 4. The Government and people of the United States are hereby obliged to secure to the said Choctaw Nation of Red People the jurisdiction and government of all the persons and property that may be within their limits west, so that no Territory or State shall ever have a right to pass laws for the government of the Choctaw Nation of Red People and their descendants; and that no part of the land granted them shall ever be embraced in any Territory or State; but the U. S. shall forever secure said Choctaw Nation from, and against, all laws except such as from time to time may be enacted in their own National Councils, not inconsistent with the Constitution, Treaties, and Laws of the United States; and except such as may, and which have been enacted by Congress, to the extent that Congress under the Constitution are required to exercise a legislation over Indian Affairs. But the Choctaws, should this treaty be ratified, express a wish that Congress may grant to the Choctaws the right of punishing by their own laws, any white man who shall come into their nation, and infringe any of their national regulations.[21]

The removal treaties of other Indian nations may be less precise, but in each there are evidences that the nations understood some part of the threat they faced and took steps to protect themselves. In all cases they must have felt, like the Choctaws, that these treaties guaranteed their continued sovereignty.

Mainly due to the unbelievably blatant theft of Indian land during the allotment period, the absorption of Indians and their land into the jurisdiction of the state was halted. Indian land was retained in trust by the government (so-called "restricted" status in the eastern part of Oklahoma) to help protect the remaining land. This status was extended a number of times until it finally became a permanent fixture.

The Kiowas mounted one of the few full-scale legal challenges to allotment, based on the 1867 Treaty of Medicine Lodge.[22] Article 12 of that treaty read,

No treaty for the cession of any portion or part of the reservation herein described, which may be

held in common, shall be of any validity or force as against the said Indians, unless executed and signed by at least three-fourths of all the adult male Indians occupying the same, and no cession by the tribe shall be understood or construed in such manner as to deprive, without his consent, any individual member of the tribe of his rights to any tract of land selected by him as provided in Article 3 of this treaty.

Since the requisite signatures had not been gathered, the Kiowa maintained that allotment was illegal. The 1903 Supreme Court decision in *Lone Wolf v. Hitchcock*[23] made it clear that Congressional Plenary Power included the power to break treaties.

Writing for the majority, Justice White said,

The provisions in article 12 of the Medicine Lodge treaty of 1867 … cannot be adjudged to materially limit and qualify the controlling authority of Congress in respect to the care and protection of the Indians and to deprive Congress, in a possible emergency, when the necessity might be urgent for a partition and disposal of the tribal lands, of all power to act… . Congress has always exercised plenary authority over the tribal relations of the Indians and the power has always been deemed a political one not subject to be controlled by the courts.

In view of the legislative power possessed by Congress over treaties with the Indians … the action of Congress is conclusive upon the courts.

The power exists to abrogate the provisions of an Indian treaty, though presumably such power will be exercised only when circumstances arise which will not only justify the government in disregarding the stipulations of the treaty, but may demand, in the interest of the country and the Indians themselves, that it should be so. …

… If injury was occasioned, which we do not wish to be understood as implying, by the use made by Congress of its power, relief must be sought by an appeal to that body for redress and not to the courts.[24]

From Oklahoma statehood until the Great Depression, Indian tribes were dealt with ummarily by the U.S. Government. Technically, the tribes were supposed to have ceased to exist. Practically, it was much easier to deal with a tribe collectively rather than with dealing with each individual member. During this period the U.S. Government at times resorted to literally picking an Indian off the street and appointing them "chief" to sign documents on behalf of the tribe. This period marks the nadir of tribal sovereignty. In 1924 Congress passed the Indian Citizenship Act[25] making all Indians citizens of the U.S. whether they had received an allotment or not. They did this despite a government report[26] stating that Indians did not want citizenship. This act was a serious departure for the Congress. Prior to this the Indian's allegiance[27] had been a key issue. The U.S. government recognized that their allegiance was to their tribal governments and were thus not made citizens by the accident of having been born within the territorial limits of the U.S.

Indians born within the territorial limits of the United States, members of, and owing immediate allegiance to, one of the Indian tribes, (an alien though dependent power,) although in a geographical sense born in the United States, are no more 'born in the United States and subject to the jurisdiction thereof,' within the meaning of the first section of the fourteenth amendment, than the children of subjects of any foreign government born within the domain of that government, or the children born within the United States, of ambassadors or other public ministers of foreign nations.[28]

Thus, even though the Government recognized that Indian people's primary allegiance was to their tribe and they did not want U.S. citizenship, they were forced to accept it anyway.

The debacle of allotment thrust Indian people even further into poverty, which was worsened by the Depression. The Indian Reorganization Act .(IRA)[29]of 1934 sought to redress the wrongs through a variety of initiatives including re-recognizing tribal governments, saying in part:

"…constitution adopted by said tribe shall vest in such tribe or tribal council the following powers…." which seems to be a recognition that popular sovereignty endowed the tribes with such powers. In fact, the U.S. Government maintained tight control over the tribes and all acts of their "governments" were subject to scrutiny. Many Oklahomans, including some Indians, lobbied successfully to exempt Oklahoma Indians from the act. Despite this, two years later, Oklahoma Indian Welfare Act (OIWA)[30] brought the same benefits to the Indians of Oklahoma. The IRA and OIWA organized tribes as business entities. It is this reason that so many tribes have a governing body known as the "Business Committee" and a chief known as the "chairman." Though these governments were a far cry from traditional governments and may not have been meant to be""real" governments by the original authors of the legislation, the IRA and OIWA were still an important milestone. Tribal governments were on the rise.

Reaction to the re-recognition of tribes was immediate and vociferous, but no substantive change was made until after World War II. In 1953, two pieces of legislation were enacted to effectively destroy Indian nations. The Termination Act[31] granted "sufficiently advanced" tribes the supposed boon of termination of government guardianship, as well as the termination of their own governments. The tribe would cease to exist, its members merely citizens of the United States. Termination was supposed to be voluntary, but in fact various inducements and outright coercion were used to get tribes to volunteer. Like allotment, termination was devastating to the tribes that were terminated. Money and land flowed quickly out of Indian hands.

Also enacted in 1953, Public Law 280[32] (PL 280) did not terminate effected tribes. Instead, it sought to bring tribes involuntarily under the civil and criminal jurisdiction of the states. However, the act did not include provisions to bring Indian lands under state taxation and thus many states (like Oklahoma) did not bother to request inclusion in PL 280. States written into the original legislation include Alaska, California, Minnesota, Nebraska, Oregon, and Wisconsin. States that have assumed at least some jurisdiction since the enactment of PL 280 include: Nevada, South Dakota, Washington, Florida, Idaho, Montana, North Dakota, Arizona, Iowa, and Utah. Termination was itself terminated in the 1960's, while PL 280 was amended to make it necessary for the tribes to request state jurisdiction. No tribe has ever requested to be placed under state jurisdiction.
Though court cases affecting sovereignty were mixed in the 1970's,[33] the civil rights movement and "red-power" movements helped to spur sweeping changes implemented in a string of legislation beginning in 1975 and culminating in 1994.[34] P.L. 93-638, the Indian Self-Determination and Education Assistance Act[35] allows Indian nations to act as government contractors, providing their own services. Indian nations receiving these "638 contracts" expect to receive a number of benefits. Monies that had gone to non-Indian contractors to provide these services now go to the Indian nation itself. Some of the monies for administering the programs now flow to the tribal government rather than the Bureau of Indian Affairs. But perhaps most importantly, the Indian Nations provide their own services, knowing their own needs; sympathetic to their own problems; cognizant of their own customs.

Though a watershed change in policy, self-determination contracts are still much like any other U.S. Government contract. It is still the Federal Government that determines the needs to be met and the programs to meet them. The initiative possible under these contracts is severely limited. P.L. 103-413, Title II, the Self-Governance Act[36] changes this by allowing Indian nations to "compact" rather than contract these services. Compacting is considered as a government-to-government agreement in which the Indian nation takes over responsibility for various services. By compacting they can have all of the benefits of 638 contracts along with greater initiative. *Trying a New Way: The Independent*

Assessment Report on the Self-Governance Demonstration Project outlined a number of benefits of self-governance including, better law enforcement; improved quality of tribal services; remarkable flexibility in meeting needs; facilitation of long-range planning; increased responsibility and accountability for tribal officials; better record management and accounting; increased participation of tribal members in priority setting; more efficient utilization of resources; quicker response to changing needs; consolidation of programs; and revision of tribal budgeting, organization, administration and government. [37]

Today, we live in the era of self-governance. The Doctrine of Inherent and Retained Sovereignty is well established, though there are always forces at work seeking to destroy tribal sovereignty.

Myths, Legends and the Real Powers of Indian Sovereignty

Opponents of Indian sovereignty have perpetuated a number of myths that are designed to anger the average non-Indian. Some of them are completely absurd, but some do bear a faint relationship to the truth.

Indians get federal money just for being "Indian"

Untrue. In some cases they may get money from the leasing of land for mining or timber, or money from the sale of lands. This is money that is owed to them for value received. These monies are administered by the U.S. Government, supposedly for the benefit of Indian people. However, many authorities believe that Indian people have usually only received about 1/10 the value of their land and resources. Today, the BIA stands in contempt of court because it cannot account for billions of dollars justly owed to Indian people.

Indians get to go to school for free.

Untrue. Historically there were a number of partial scholarships administered through the BIA, just as there are numerous grants and scholarships open to non-Indians. Today, most scholarship money awarded to Indians comes from tribal funds, not U.S. government money.

Indian people do not pay taxes.

Untrue, but can be made to sound true. All Indian people pay taxes to all governments with relevant jurisdiction. All Indians have to pay federal taxes. Some Indian people do not have to pay some state taxes, usually property taxes, because their land is restricted or in trust and thus not within the jurisdiction of the state. An even smaller number do not pay state income tax because they both live and work on trust land and thus do not come under state jurisdiction where they live or work. Statistics on this are unclear, but the percentage of Indians who do not pay property taxes should be less than half, while the percentage that do not pay state income tax would be tiny.

The status of Indians in this respect is similar to U.S. servicemen. Servicemen work on federal reservations and thus do not work within the jurisdiction of a state. They pay income taxes to the state in which they officially maintain residence (this may not be the state they are stationed in). If their state of residence has no income tax, then they pay no state income tax. The Indian people in question live and work within tribal jurisdiction and thus are subject only to federal and tribal taxes, not to state taxes.

Tribes do not pay taxes.

True but misleading. Tribes do not have to pay taxes (even state sales taxes) on items bought for governmental purposes, but this is true of all governments. They also do not have to pay state taxes on tribal businesses located on reservations, because these businesses are not within the jurisdiction of the state. However, the most lucrative of these, gaming, is covered under the National Indian Gaming Regulatory Act, which requires a compact, or agreement, with the state. These state compacts always require some payment to the state. Though technically not a "tax," the money paid is almost always much more than the money that the state could expect a non-Indian business to pay as a tax.

One tribe, for example, signed a compact in which they would pay more than half of their profits to the state. States have also entered into compacts with tribes concerning many tribal enterprises and receive payments from the tribes despite the fact that the tribal enterprises are outside state jurisdiction.

Additionally, it should be noted here, that tribes do not"“profit” from these enterprises in the way that private businesses do. Tribal “profits” are put back into programs for the people of the tribe, who are also people of the state. Non-Indian businesses profit their owners, who may be from out-of-state. Profits of non-Indian businesses only provide social services through taxes and donations by the owners.

Effectively, it would be more appropriate to say that tribal businesses have a 100% tax, since every dollar will go to people of the state either as wages or as social programs.

Conclusion

The Founding Fathers of the United States began what is probably the greatest experiment in governance ever attempted by humanity. They envisioned a nation governed not by the whims of rulers, but by laws. They believed that laws derived their just powers from the consent of the governed and that these laws must be limited by the inherent rights of human beings.

Unfortunately, the U.S. has not always been governed by men as farsighted as the Founders and the masses of the people have not always understood the wisdom of this system of government. Even worse, greed and racism have often worked to blind people to injustice. The legal history of American Indian people in the United States is probably the best example of this.

Though the U.S. is supposed to recognize property rights, it used pre-existing European laws that didn’t to take Indian lands. When pushed for a legal justification, it resorted to the Right of Conquest, which the U.S. now denounces and has even gone to war over; the first U.S. invasion of Iraq was over its conquest of Kuwait. The U.S. has claimed a right to govern Indian people, despite the fact that the Indian people never consented to be governed by the United States. The U.S. often justified these claims by referring to Indian people as “savages.”

Yet, today the United States government recognizes that its own Constitution was influenced by the government of the Iroquois people.[38] Despite historical lapses, the fundamental justice of popular sovereignty and human rights have not been completely forgotten by the U.S. government and people.

Though there is no way to rectify the past, the U.S. today recognizes the Inherent and Retained Sovereignty of Indian nations. It maintains government-to-government relations with Indian nations and has often found common ground to work with these nations.

Both peoples share many of the same hopes, dreams and failings. Just as the various local and state governments use such commonalities to help overcome their conflicts, visionary Oklahoma leaders of today can work toward mutually beneficial agreements with tribal governments.

Footnotes

[1] Definition taken from Nolan, Black, Henry Campbell, *Black’s Law Dictionary, Sixth*

Edition, ed. by Joseph R and Nolan-Haley, Jacqueline M., et. al., (St. Paul. West Publishing, 1990), 1396.

[2] Thurman Lee Hester, Jr., "Sovereignty, *Philosophy of Law: An Encyclopedia*, ed. by Barry Gray, (Garland: 1999), 824-826.

[3] *Johnson v. McIntosh*, 8 Wheaton 543 (1823), 572-592.

[4] As quoted by Francis Paul Prucha, *American Indian Policy in the Formative Years: The Trade and Intercourse Acts, 1790-1834*, (Cambridge: Harvard University, 1962),141.

[5] *U.S. Code*, Title 25, Chapter 38,£3601. Other references to inherent sovereignty or authority of all or specified tribes are found in the texts of£1300f,£1301,£2501,£3602,£3631 and in the notes of£458aa,£1300f and£1301, all in their respective chapters of Title 25.

[6] *United States v. Wheeler*, 435 U.S. 313, (1978), at 323.

[7] *Worcester v. Georgia*, 6 Peters 515 (1832), 559.

[8] For a complete history of the Doctrine of Discovery see, Robert A. Williams Jr., *The American Indian in Western Legal Thought*, (New York and Oxford: Oxford University, 1990).

[9] *Johnson v. McIntosh*, ibid.

[10] *Cherokee Nation v. Georgia*,5 Peters 1 (1831), 15-16, 20.

[11] ibid.

[12] *Worcester v. Georgia*, 6 Peters 515 (1832), 561.

[13] Though this implication is not true, it has often been cited as a justification for Plenary Power. For an explanation of what Marshall probably meant, see: Thurman Lee Hester, Jr., *Political Principles and Indian Sovereignty*, (Routledge: 2001), 47-48.

[14] Ibid., 561.

[15] Ibid., 559-560.

[16] *ex Parte Crow Dog*, 109 U.S. 556 (1883).

[17] *U.S. Statutes at Large*. 23:385.

[18] *U.S. Statutes at Large*, 24:388.

[19] H. Rept. No. 1576, May 28, 1880, 46th Cong., 2nd sess., 10.

[20] Angie Debo, *And Still the Waters Run: The Betrayal of the Five Civilized Tribes*, (Princeton: Princeton University, 1940; reprint Norman and London: University of Oklahoma, 1989).

[21] TREATY WITH THE CHOCTAW {1830, Sept.27} 7 Stat., 333. Proclaimed, Feb. 24, 1831.

[22] TREATY WITH THE KIOWA AND COMANCHE {1867, Oct.21} 15 Stat.,81. Proclaimed, Aug. 25. 1868.

[23] *Lone Wolf v. Hitchcock* 187 U.S. 553 (1903). For an excellent account of this case, see Blue Clark, *Lone Wolf v. Hitchcock: Treaty Rights and Indian Law at the End of the Nineteenth Century*, Law in the American West vol. 5,

(Lincoln and London: University of Nebraska, 1994).

[24] *Lone Wolf v. Hitchcock*, Ibid., 553-568.

[25] *U.S. Statutes at Large*, 43:253.

[26] Administration of the Indian Office (Bureau of Municipal Research Publication no. 65, 1915), 17. As cited by Cohen, 155.

[27] Allegiance was a key citizenship issue around the world as well as in the U.S., *see United States v. Wong Kim Ark*, 169 U.S. 649 (1898). Pages 655-658 discuss this issue giving numerous international precedents.

[28] *Elk v. Wilkins*, 112 U.S. 94. (1884), 102.

[29] *U.S. Statutes at Large*, 48:948.

[30] *U.S. Statutes at Large*, 49:1967.

[31] *U.S. Statutes at Large*, 67:B132

[32] *U.S. Statutes at Large*, 67:588.

[33] Charles F. Wilkinson, *American Indians, Time, and the Law: Native Societies in a Modern Constitutional Democracy*, (New Haven and London: Yale, 1987), 59-62 discusses the contradictory cases of this period. In the end the courts relied on the notion of inherent sovereignty, mirroring the legislative initiatives being advanced, so a detailed discussion of these cases is unimportant. However, the fact that they occurred is just another example that the law is in flux and the status of Indian sovereignty is far from certain.

[34] The most important, in order of passage are, P.L. 93-638, Jan 4th 1975, known as the "Indian Self-Determination and Education Assistance Act"; *U.S. Statutes at Large* 88:203. P.L. 100 472, Oct. 5th 1988; *U.S. Statutes at Large* 102:2298, particularly Title III, known as the "Self-Governance Demonstration Project"; P.L. 101-644, Nov. 29th 1990, *U.S. Statutes at Large* 104:4665; P.L. 103-176, Dec. 3, 1993, *U.S. Statutes at Large* 107:2004, known as the "Indian Tribal Justice Act"; P.L.103-413 Oct 25th, 1994, *U.S. Statutes at Large* 108:4270, particularly Title II, known as the "Self-Governance Act".

[35] *U.S. Statutes at Large* 88:203.

[36] *U.S. Statutes at Large* 108:4270. Elements of this were originally tried on a temporary basis under P.L. 100-472, Oct. 5th 1988, *U.S. Statutes at Large* 102:2298, Title III, known as the Self-Governance Demonstration Project.

[37] The Center for the Study of Indian Law and Policy, the University of Oklahoma and The Center for Tribal Studies, Northeastern State University, Tahlequah, *Trying a New Way: The Independent Assessment Report on the Self-Governance Demonstration Project*, (GPO, 1991), VII-VIII.

[38] H.Con.Res. 331, passed by the House of Representatives on October 4, 1988 and passed by the Senate on October 21, 1988.

EPA Policy for Programs on Indian Reservations

William Ruckelshaus, Director, Environmental Prtection Agency, November 8, 1984

Introduction

The President published a Federal Indian Policy on January 24, 1983, supporting the primary role of Tribal Governments in matters affecting American Indian reservations. That policy stressed two related themes: (l) that the Federal Government will pursue the principle of Indian"self government" and (2) that it will work directly with Tribal Governments on a "government-to-government" basis.

The Environmental Protection Agency (EPA) has previously issued general statements of policy which recognize the importance of Tribal Governments in regulatory activities that impact reservation environments. It is the purpose of this statement to consolidate and expand on existing EPA Indian Policy statements in a manner consistent with the overall Federal position in support of Tribal "self-government" and "government-to-governments" relations between federal and Tribal Governments. This statement sets forth the principles that will guide the Agency in dealing with Tribal Governments and in responding to the problems of environmental management on American Indian reservations in order to protect human health and the environment. The Policy is intended to provide guidance for EPA program managers in the conduct of the Agency's congressionally mandated responsibilities. As such, it applies to EPA only and does not articulate policy for other Agencies in the conduct of their respective responsibilities.

It is important to emphasize that the implementation of regulatory programs which will realize these principles on Indian Reservations cannot be accomplished immediately. Effective implementation will take careful and conscientious work by EPA, the Tribes and many others. In many cases, it will require changes in applicable statutory authorities and regulations. It will be necessary to proceed in a carefully phased way, to learn from successes and failures, and to gain experience. Nonetheless, by beginning work on the priority problems that exist now and continuing in the direction established under these principles, over time we can significantly enhance environmental quality on reservation lands.

Policy

In carrying out our responsibilities on Indian reservations, the fundamental objective of the Environmental Protection Agency is to protect human health and the environment. The keynote of this effort will be to give special consideration to Tribal interests in making Agency policy, and to insure the close involvement of Tribal Governments in making decisions and managing environmental programs affecting reservation lands. To meet this objective, the Agency will pursue the following principles:

1.THE AGENCY STANDS READY TO WORK DIRECTLY WITH INDIAN TRIBAL GOVERNMENTS ON A ONE-TO-ONE BASIS (THE "GOVERNMENT - TO - GOVERNMENT" RELATIONSHIP), RATHER THAN AS SUBDIVISIONS OF OTHER GOVERNMENTS.

EPA recognizes Tribal Governments as sovereign entities with primary authority and responsibility for the reservation populace. Accordingly, EPA will work directly with Tribal Governments as the independent authority for reservation affairs, and not as political subdivisions of States or other governmental units.

2.THE AGENCY WILL RECOGNIZE TRIBAL GOVERNMENTS AS THE PRIMARY PARTIES FOR SETTING STANDARDS,

MAKING ENVIRONMENTAL POLICY DECISIONS AND MANAGING PROGRAMS FOR RESERVATIONS, CONSISTENT WITH AGENCY STANDARDS AND REGULATIONS.

In keeping with the principle of Indian self-government, the Agency will view Tribal Governments as the appropriate non-federal parties for making decisions and carrying out program responsibilities affecting Indian reservations, their environments, and the health and welfare of the reservation populace. Just as EPA's deliberations and activities have traditionally involved the interests and/or participation of State Governments, EPA will look directly to Tribal Governments to play this lead role for matters affecting reservation environments .

3.THE AGENCY WILL TAKE AFFIRMATIVE STEPS TO ENCOURAGE AND ASSIST TRIBES IN ASSUMING REGULATORY AND PROGRAM MANAGEMENT RESPONSIBILITIES FOR RESERVATION LANDS.

The Agency will assist interested Tribal Governments in developing programs and in preparing to assume regulatory and program management responsibilities for reservation lands. Within the constraints of EPA's authority and resources, this aid will include providing grants and other assistance to Tribes, similar to what we provide State Governments. The Agency will encourage Tribes to assume delegable responsibilities, (i.e. responsibilities which the Agency has traditionally delegated to State Governments for non-reservation lands) under terms similar to those governing delegations to States.

Until Tribal Governments are willing and able to assume full responsibility for delegable programs, the Agency will retain responsibility for managing programs for reservations (unless the State has an expressed grant of jurisdiction from Congress sufficient to support delegation to the State Government). Where EPA retains such responsibility, the Agency will encourage the Tribe to participate in policy-making and to assume appropriate lesser or partial roles in the management of reservation programs.

4.THE AGENCY WILL TAKE APPROPRIATE STEPS TO REMOVE EXISTING LEGAL AND PROCEDURAL IMPEDIMENTS TO WORKING DIRECTLY AND EFFECTIVELY WITH TRIBAL GOVERNMENTS ON RESERVATION PROGRAMS.

A number of serious constraints and uncertainties in the language of our statutes and regulations have limited our ability to work directly and effectively with Tribal Governments on reservation problems. As impediments in our procedures, regulations or statutes are identified which limit our ability to work e effectively with Tribes consistent with this Policy, we will seek to remove those impediments.

5.THE AGENCY, IN KEEPING WITH THE FEDERAL TRUST RESPONSIBILITY, WILL ASSURE THAT TRIBAL CONCERNS AND INTERESTS ARE CONSIDERED WHENEVER EPA'S ACTIONS AND/OR DECISIONS MAY AFFECT RESERVATION ENVIRONMENTS.

EPA recognizes that a trust responsibility derives from the historical relationship between the Federal Government and Indian Tribes as expressed in certain treaties and Federal Indian Law. In keeping with that trust responsibility, the Agency will endeavor to protect the environmental interests of Indian Tribes when carrying out its responsibilities that may affect the reservations.

6.THE AGENCY WILL ENCOURAGE COOPERATION BETWEEN TRIBAL, STATE AND LOCAL GOVERNMENTS TO RESOLVE ENVIRONMENTAL PROBLEMS OF MUTUAL CONCERN.

Sound environmental planning and management require the cooperation and mutual consideration of neighboring governments, whether those governments be neighboring States, Tribes, or local units of government. Accordingly, EPA will encourage early communication and cooperation among Tribes, States and local Governments. This is not intended to lend Federal support to any one party to the jeopardy of the interests of the other. Rather, it recognizes that in the field of environmental regulation, problems are often shared and the principle of comity between equals and neighbors often serves the best interests of both.

7.THE AGENCY WILL WORK WITH OTHER FEDERAL AGENCIES WHICH HAVE RELATED RESPONSIBILITIES ON INDIAN RESERVATION TO ENLIST THEIR INTEREST AND SUPPORT IN COOPERATIVE EFFORTS TO HELP TRIBES ASSUME ENVIRONMENTAL PROGRAM RESPONSIBILITIES FOR RESERVATIONS.

EPA will seek and promote cooperation between Federal agencies to protect human health and the environment on reservations. We will work with other agencies to clearly identify and delineate the roles, responsibilities and relationships of our respective organizations and to assist Tribes in developing and managing environmental programs for reservation lands.

8.THE AGENCY WILL STRIVE TO ASSURE COMPLIANCE WITH ENVIRONMENTAL STATUTES AND REGULATIONS ON INDIAN RESERVATIONS.

In those cases where facilities owned or managed by Tribal Governments are not in compliance with federal environmental statutes, EPA will work cooperatively with Tribal leadership to develop means to achieve compliance, providingtechnical support and consultation as necessary to enable Tribal facilities to comply. Because of the distinct status of Indian Tribes and the complex legal issues involved, direct EPA action through the judicial or administrative process will be considered where the Agency determines, in its judgment, that: (l) a significant threat to human health or the environment exists, (2) such action would reasonably be expected to achieve effective results in a timely manner, and (3) the Federal Government cannot utilize other alternatives to correct the problem in a timely fashion.

In those cases where reservation facilities are clearly owned or managed by private parties and there is no substantial Tribal interest or control involved, the Agency will endeavor to act in cooperation with the affected Tribal Government, but will otherwise respond to noncompliance by private parties on Indian reservations as the Agency would to noncompliance by the private sector elsewhere in the country. When the Tribe has a substantial proprietary interest in, or control over, the privately owned or managed facility, EPA will respond as described in the first paragraph above.

9.THE AGENCY WILL INCORPORATE THESE INDIAN POLICY GOALS INTO ITS PLANNING AND MANAGEMENT ACTIVITIES, INCLUDING ITS BUDGET, OPERATING GUIDANCE, LEGISLATIVE INITIATIVES, MANAGEMENT ACCOUNTABILITY SYSTEM AND ONGOING POLICY AND REGULATION DEVELOPMENT PROCESSES.

It is a central purpose of this effort to ensure that the principles of this Policy are effectively institutionalized by incorporating them into the Agency's ongoing and long-term planning and management processes. Agency managers will include specific programmatic actions designed to resolve problems on Indian reservations in the Agency's existing fiscal year and long-term planning and management processes.

William D. Ruckelshaus
Administrator
Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Washington, DC 20460
July 11, 2001

MEMORANDUM

SUBJECT: EPA Indian Policy
TO: All EPA Employees

In 1984, EPA became the first federal agency to adopt a formal Indian policy, when William D. Ruckelshaus pledged that the Agency would support the primary role of tribal governments in matters affecting American Indian country.

The United States has a unique legal relationship with Tribal Governments based on the Constitution, treaties, statutes, Executive Orders and court decisions. This relationship includes a recognition of the right of tribes as sovereign governments to self-determination, and an acknowledgment of the Federal government's trust responsibility to the Tribes.

I hereby reaffirm the Agency's commitment to this long established policy and the principles therein that guide the Agency in building a stronger partnership with Tribal Governments to protect the human health and environment of Indian communities.

Christine Todd Whitman

The Inter-Tribal Environmental Council of Oklahoma

Lee Hester, Director of American Indian Studies, University of Science and Arts of Oklahoma and Director of the Howard Meredith Indian Humanities Center.

The Inter-Tribal Environmental Council (ITEC) is a group of American Indian Tribes that have contracted the Cherokee Nation's Office of Environmental Services (OES) to act as their agent for development, reception and administration of some grants related to environmental services.

Through ITEC, the OES administers programs that provide technical support, training and environmental services for ITEC member tribes. The ITEC staff comprises over 20 environmental specialists in a variety of areas who are paid staff members of the Cherokee Nation's OES.

ITEC member tribes include the following Oklahoma tribes: Absentee-Shawnee, Alabama-Ouassarte Tribe Town, Apache Tribe, Caddo Indian Tribe, Cherokee Nation, Cheyenne/Arapaho Tribes, Citizen Potawatomi Nation, Comanche Nation, and Delaware Nation ...

... the Delaware Tribe, Fort Sill Apache Tribe, Kaw Nation, Kialegee Tribal Town, Kickapoo Tribe, Kiowa Tribe, Miami Tribe, Modoc Tribe, Muscogee "Creek" Nation, Otoe-Missouria Tribe, Ottawa Tribe, and Pawnee Tribe ...

... and the Peoria Tribe, Ponca Tribe, Sac & Fox Nation, Seminole Nation, Seneca Cayuga Tribe, Thlopthlocco Tribal Town, Tonkawa Tribe, Wichita & Affiliated Tribes.

The following Oklahoma tribes are **NOT** affiliated with ITEC: Chickasaw Nation, Choctaw Nation, Eastern Shawnee Tribe, Iowa Tribe of Oklahoma, Osage Nation, Quapaw Tribe of Oklahoma, Shawnee Tribe, United Keetoowah Band of Cherokee Indians and the Wyandotte Nation.

ITEC programs include:

Clean Air: Monitoring, mapping, inventorying sources, reviewing state source permits, technical assistance and training.
General Assistance Program (GAP): Development of administrative and technical infrastructure for environmental programs.

Hazardous Waste: Assistance in relevant programs under the Resource Conservation and Recovery Act (RCRA).

Solid Waste: Assistance in relevant programs under RCRA including: Inventorying dump sites and identification of waste management alternatives.

Underground Storage Tanks (UST): Assistance in securing funding to upgrade UST's as well as monitoring UST's and training tribal personnel to help ensure tribal compliance with EPA regulations.
Superfund: Evaluation of potential sites, technical assistance with existing sites and investigation and feasibility studies.

ITEC Brownfields Response Program: Comprehensive services and programs under the Small Business Liability Relief and Brownfields Revitalization Act.

ITEC specifically disclaims the power to act or speak on behalf of its member tribes except in those areas in which individual tribes have authorized it to do so. Member tribes retain all elements of their sovereignty and may decline specific ITEC services or withdraw from ITEC completely.

Because sovereignty rests with the tribes, each tribe makes it own policy and regulatory decisions. Additionally, the regulatory power of each tribe derives from it's inherent and retained sovereignty and thus is inherent in each individual tribe and is not subsumed by ITEC. Though ITEC administers programs that are meant to help member tribes develop their capacity to manage environmental programs, including such things as the formulation of policy and regulations, tribal sovereignty and ITEC policy ensure that the policy and regulations are each tribe's and not ITEC's.

ITEC's assistance includes programs that can help member tribes to achieve "Treatment as a State" (TAS) status. TAS status is part of EPA regulations to qualify tribes for certain grants and programs under the Clean Water, Safe Drinking Water and Clean Air Acts that had been previously open only to states. TAS does not confer any special powers or jurisdictions on tribes. Tribal jurisdiction and power comes from tribal inherent and retained sovereignty. TAS primarily opens up certain federal monies and programs to tribal use.

Historically, some tribes outside Oklahoma have used capacity building grants such as those administered by ITEC to achieve TAS status and then used TAS status to qualify for grants that assisted them in further developing their environmental programs. After sufficient development, some of these tribes have adopted environmental regulations within their jurisdiction. Though TAS status has assisted these tribes in ensuring that their regulations are cogent, it has little or no further role. Ultimately, tribal regulation and jurisdiction are elements of tribal sovereignty, not TAS status.

In sum, ITEC's role is limited but important. It provides critical assistance to those tribes that cannot or do not wish to maintain the administration and infrastructure necessary for many federal grants and programs related to the environment. Though ITEC may advise and assist tribes in development of policy and regulations related to the environment, these are ultimately the affair of tribal governments. Tribal governments have the inherent and retained sovereignty that provides them with the jurisdiction and power to formulate and implement policies and regulations.

ITEC can only act as an agent in those limited areas defined by it's own charter and granted by its member tribes. Though ITEC may assist tribes in achieving TAS status, such status only opens up grant opportunities and does little to enhance a tribe's jurisdiction.

This Generation's Problem

Miles Tolbert, Secretary of the Environment, State of Oklahoma

If economics is the dismal science, ecology should be the joyful one.

A generation ago our society realized that we were doing serious harm to the natural world and promptly got serious about doing something to fix it. In rapid succession we passed landmark legislation like the Endangered Species Act, the Clean Air and Clean Water acts, and the Superfund Act. These statutes worked.

The quantity of pollutants that we put into the water and the air dropped and have continued to drop. The pollution created by an average automobile has decreased more than 90% since 1970. The number of cities and towns that send sewage untreated to rivers and streams has dropped to zero.

In fact the total amount of waste of all sorts released into the environment in Oklahoma has dropped by two–thirds just since 1988. Meanwhile several species, such as the bald eagle and the peregrine falcon, have been brought back from the edge of extinction.

Unfortunately, for all these improvements, many species of animals in Oklahoma continue to slip away. Familiar species like the bob white quail show a stubbornly steady decline in numbers. Other species have dropped precipitously. Oklahoma has about 50% of the Bell's vireo population it had in 1965 and just 30% of the orchard orioles of 25 years ago. Perhaps most dramatically, Prairie chicken populations in northeastern Oklahoma have declined by 90% in just the last few years.

Roughly a third of Oklahoma's birds could become rare in our children's lifetimes if current trends continue. Some species, like the Arkansas River Shiner may simply wink out completely.

It is clear that we are doing something wrong.

Something which is not so much the result of what chemicals we are disposing of on the land but how we use the land itself. Habitat, both in terms of quality and quantity, is the single most limiting factor in preserving healthy fish and wildlife populations in Oklahoma.

Species decline is almost universally caused by habitat decline. In Oklahoma, less than 15% of original bottomland hardwoods remain, over 70% of original wetlands have been drained or filled, nearly 70% of short and tall grass prairies have been lost or degraded. The loss, fragmentation, and transformation of habitat all drive the decline in wildlife.

The solution to this destruction of habitat is the key environmental challenge for this generation of Oklahomans.

THREE POSSIBLE SOLUTIONS

There are two distinctive features of land in Oklahoma. One, which will surprise none of us, is that the primary use of land in this state is for agriculture.

Fields, pastures, and woodlands make up 75.6% of the land in Oklahoma. The second distinctive feature, which may surprise some, is that land here is overwhelmingly in private hands. In the country as a whole nearly 50% of the land is owned by one level of the government or another, in Oklahoma that number is closer to 5%. The amount of that land devoted to conservation purposes is even smaller – about 2%

What this means is that if we are to address the problems of declining wildlife, we cannot rely on the current "zoo" approach – conserving relatively small areas in wildlife refuges and state parks. Instead the solution lies in the hands of the owners

of private, agricultural lands. The question then is what voluntary measures can we encourage which will transform the agricultural land into a landscape that is not only economically productive but also ecologically vibrant. Although there are many approaches to this problem, I would like to put forward three I consider of particular promise.

1
Riparian Buffers

Ecologically the most important part of any landscape is the riparian area – the area immediately along the banks of a stream or river. Agriculturally the least productive area of field is very often this same riparian area. This presents an exceptional opportunity. Creation of a buffer along streams where native vegetation is reestablished and livestock are fenced out will:

(1) Decrease bank erosion (2) Filter the runoff of pollutants (3) Lower stream temperatures (4) Improve in-stream habitats (5) Reduce the impacts of cattle or other livestock in the waterway and (6) Enhance the aesthetics of the stream

There are several federal programs which make money available to private landowners for the establishment of such buffer areas. In the past we have not done a very good job of prioritizing these programs or ensuring that farmers and ranchers were aware of these programs. Nor have we done a good job of ensuring that private efforts for such protection are recognized and encouraged. Early last year Tim and Josie Driskill of Tulsa donated an easement over two miles of riparian buffer on Spavinaw Creek. This is an act that should be trumpeted and emulated.

2
Eco-Tourism

A second approach is to promote "eco-tourism", which will provide direct financial rewards to those landowners who choose to manage their properties in ways that improve habitat. Potential""eco-tourists" are birders, hikers, or just urban families who want a taste of rural life. However, in Oklahoma the best established form of ecotourism is the practice of selling hunting or fishing leases on rural land. Income from hunting leases on prime areas now forms an important part of the income of many Oklahoma landowners – and the price is trending steadily upwards. In fact, T. Boone Pickens' latest effort is buying up working ranches, improving their capacity for wildlife and reselling them purely as hunting properties.

3
Nature As a Crop

More fundamentally we can seek to change the way that agriculture is conducted to make it more closely resemble original patterns of land use. For example, we have suppressed fire in areas that ordinarily would have burned in wildfires every few years. The result is an explosion in the eastern red cedar, which displaces native trees and deprives other vegetation of desperately needed moisture. Similarly, we have reduced the acreage covered by native grasses. We can change this by increasing the incentives under the conservation reserve program to plant native rather than old world grasses. We can also pursue the development of markets for native plants – even ones so basic as grass. Research is now being done to develop technology which would allow switchgrass to be used as a source for automobile fuels, which would provide an incentive to replant areas now given over to other crops in native tall grasses.

Conclusion
At least for those of us not coming from Oklahoma City, the drive to Norman where this year's Town Hall will be held, should be reassuring. Outside of the large cities, cattle graze, fields and grasslands spread out wide, and forests reach upward toward blue skies.

In absolute terms very little of Oklahoma is developed. However, nearly all of the state is altered from its original condition.

A prior generation tamed what pours from our smokestacks and oozes from our drainpipes. We must now learn how to make wild again at least a portion of the landscape.

DEQ ... "for a clean, attractive, prosperous Oklahoma."

Steve Thompson, DEQ Executive Director

The Mission Statement of the Oklahoma DEQ is short and to the point —"The Department of Environmental Quality …for a clean, attractive, prosperous Oklahoma." DEQ's Goals include the following:

1. Solve problems through effective processes, rules application and innovative approaches while maintaining an effective and appropriate federal relationship.

2. Provide standardized, effective, timely and enforceable permitting processes.

3. Provide services to citizens, local government and businesses on issues within the Department's mission.

4. Solve problems through a responsive, equitable and timely environmental complaints process and emergency response system.

5. Provide consistent inspection, monitoring and enforcement within the bounds of the Department's statutory jurisdiction.

DEQ is the state agency responsible for protection of the quality of Oklahoma's air, water and land. Many people may not understand the roles that federal, state and local government agencies, as well as entities that hold permits from these agencies, play in protecting and maintaining our environmental resources.

The role of federal government is to establish environmental quality standards for the nation as a whole. Congress enacts laws such as the Clean Air Act, the Clean Water Act, the Safe Drinking Water Act, the Resource Conservation and Recovery Act and the Superfund Act. These federal laws provide the overall strategy for environmental regulation.

The Environmental Protection Agency (EPA) adopts rules that provide the details for implementation of each of these federal laws.

The role of state government is to implement the federal laws and rules. State requirements must be at least as stringent as those of the federal law. Implementation includes development of processes to assure that the national environmental quality standards are maintained or, if they cannot currently be met, that the quality of the air, water or land is improved to meet those standards. One of the primary processes used to implement federal laws and rules is the process of permitting. For example, the federal standard for water quality in streams is that they be fishable and swimmable.

Through rules, the EPA establishes minimum requirements for state water quality standards which the state implements though adoption of standards specific to each state's ecology and needs. In Oklahoma, the DEQ issues permits to each entity that has a pollution discharge into a stream. Those permits are developed through the use of engineering standards and environmental modeling and contain both minimum control practices and specific numeric limits for the types of pollution that each permittee could be expected to generate.

DEQ
OKLAHOMA
DEPARTMENT OF ENVIRONMENTAL QUALITY
…for a clean, attractive, prosperous Oklahoma

Local government may have a dual role in the process of environmental protection. Entities of local government are permittees with regard to their wastewater discharge, water supply and solid waste disposal responsibilities. In areas such as stormwater control and setting requirements for industries that discharge into their wastewater treatment systems, local government may also issue permits.

Permittees, though their actions to maintain compliance with the terms of the permits that they hold, are the first line of defense for environmental protection. State government plays a role to assure that permittees act responsibly, first through routine inspection and secondly through vigorous enforcement action against those who do not comply with permits.

Another look at the DEQ's Mission Statement shows that an understanding of the importance of sustainable development is essential if Oklahoma is to be prosperous as well as clean and attractive. One way that DEQ works to maintain this balance is though public involvement in the process of rules development. A total of eighty-seven Oklahomans serve on eight Advisory Councils and the Environmental Quality Board. Membership is dictated by state law and includes individuals who have expertise in each of the areas regulated by the DEQ as well as citizen representation. All DEQ rules must first be approved by one of these Councils before they are sent to the EQ Board for adoption as the operating rules of the agency. This system of rule development provides a check against adoption of rules that would be damaging to the state's economy.

Key values for the DEQ include *Customer Service* and *Problem Solving*. Responsiveness, timeliness, compliance and innovation are elements of both of these values. Oklahoma's economy cannot prosper if environmental protection is viewed as a deterrent to progress. To that end, DEQ works vigorously with both economic developers and existing business and industry. DEQ was the first environmental agency in the nation to develop a Customer Assistance Program (CAP) that provides a focal point for permitting and compliance assistance. Many other states have copied Oklahoma's concepts for creating a "one-stop" shop within the agency for environmental permitting information and assistance.

When working in the area of economic development, the CAP serves as a part of the business recruitment team. Early identification of environmental permitting issues allows DEQ to work with the business to assure that permit applications are submitted in a timely manner and that DEQ review takes place at a rate that is adapted to business needs. If problems develop during the permitting process, the CAP facilitates discussions between DEQ permitting staff and the business to expedite resolution of issues. In December 2003, the DEQ was recognized by the Oklahoma Department of Commerce, the Governor's Economic Development Team and the Oklahoma Business Roundtable for outstanding service to the growth of Oklahoma's Economy.

The Customer Assistance Program provides this "one-stop" service by acting as the single point of contact for the DEQ during the initial stages of siting a new plant. This service involves forming a Permit Assistance Team, which coordinates with all the divisions in the agency to advise a new company on the permitting and other regulatory requirements of the DEQ. In addition, this service involves outlining typical timeframes for permitting and the public review process. During FY 2004, DEQ met with 16 site locators from companies interested in doing business in Oklahoma. It was the rapid and professional service given to each company by DEQ that merited the agency's recognition as an outstanding business recruitment asset for Oklahoma.

A review of the Oklahoma Academy (Town Hall) model for relationships between Culture and Human Behavior; Environment; Commerce and the Economy; and Institutions shows that the processes DEQ employs to protect the environment reflect a balance with both human behavior and economic development needs.

Oklahoma Conservation Commission

Larry Edmison, Water Quality Division Director, Oklahoma Conservation Commission

The Oklahoma Conservation Commission (OCC) is responsible for conservation of renewable natural resources through landuse planning, water quality monitoring, design and installation of non-point source pollution control practices, and soil and water conservation, as well as environmental education and wetlands conservation. The agency was created as a response to the "dust bowl" of the 1930s. Originally intended as an instrument to maintain high levels of agricultural productivity, the Commission, in partnership with the 88 Soil & Water Conservation Districts, has evolved into an agency that protects natural resources for all users, including the flora and fauna of the state, and all of the citizens of the state.

Each Conservation District is an independent unit of local government with a locally elected board of directors and one to several staff members. The Board of Directors determines the local conservation priorities that its staff implements. The federal soil and water conservation agency, the Natural Resources Conservation Service (NRCS) also maintains an active presence in the District offices. The federal personnel implement USDA agricultural policy and generally work with the Conservation District staff in areas where their programs overlap.

The Commission receives state and federal money that is passed on to the Conservation Districts for operating expenses. The Commission also handles the payroll and benefits of the District employees and oversees all state and federal programs that are implemented through the Districts. Within the Commission, the Water Quality Division operates the state ***Nonpoint Source Management Program*** and the state ***Wetland Strategy***.

Section 319 of the federal Clean Water Act directs the states to control non-point source (NPS) pollution through a variety of means and provides funding to the states to implement those programs. In Oklahoma, Section 319 monies are statutorily directed to OCC. The Water Quality Division of the agency uses these funds to accomplish three primary activities that work together to protect and restore Oklahoma's aquatic resources. The Division is statutorily directed to'monitor the state's streams and wetlands, (See 27A, OS Sec. 1-3-101) for NPS pollution, educate the citizenry on the effects and prevention of such pollution, and implement practices that demonstrate methods of controlling NPS pollution.

OCC is responsible for monitoring, assessing, and evaluating waters of the State to determine the impacts of NPS pollution. To accomplish this goal, OCC has developed a Rotating Basin Monitoring Program to monitor the overall aquatic health of streams across the State. OCC also conducts water quality and related monitoring specific to individual education or demonstration projects. OCC follows a set of peer and EPA approved Standard Operating Procedures. All data is collected under EPA approved Quality Assurance Project Plans.

In general, OCC monitors water quality, stream habitat and stream aquatic communities to evaluate impacts from non point sources. However, we also collect a variety of other information including landuse, soil nutrients, atmospheric deposition, and other pertinent information. Exceptional streams in need of protection are also identified.

The results of this monitoring are used in planning the State's NPS program, and are used to draft the NPS Assessment Report required by the Clean Water Act. The data is stored on the national water quality STORET database, on the state database maintained by the Oklahoma Department of Environmental Quality and on an internal database.

One of the most important variables to the overall aquatic health of a waterbody is its water quality. Water quality monitoring measures the physical and chemical properties of water for purposes of determining whether the water is of sufficient quality to support its beneficial uses. Parameters that are collected during water quality monitoring include things like dissolved oxygen, turbidity, nitrate, phosphorus, sulfate, & fecal bacteria. Additional parameters might include concentrations of various heavy metals, pesticides, or other organic compounds. These measurements are generally collected at equal intervals ten times per year to characterize a stream's overall water quality.

Equally important to the overall aquatic health of a system is the available habitat. Some streams have adequate water quality, but poor habitat limits the type of organisms that live in the stream. Habitat measurements are collected to characterize the type of habitat available in a waterbody and include: depth of water, embeddedness of the substrate (amount of sand, silt or clay deposited in rifles), substrate type (sand, silt, clay, cobble, gravel, bedrock, etc.), habitat type (riffle, pool, run), in-stream cover, and percent canopy cover. Just as deficient water quality conditions can be corrected, habitat problems can also be corrected if desired.

The most important measure of aquatic ecosystem health is the status of its biological community. What types of organisms live there, how diverse the community is, and how healthy the individual organisms are, provide important indicators of the overall health of the system. In almost every case, the natural aquatic organisms found in streams are more sensitive to pollution than are humans.

OCC collects information on all stages of the food chain in streams beginning with the algal or periphyton (attached algae) community. OCC also measures the type and densities of benthic macroinvertebrates (aquatic insects) and fish that live in the stream. Certain species are indicators of poor or good water quality. In addition, whether or not the community is well balanced and diverse is also a good indicator of water quality.

Blue Thumb

Our educational program, Blue Thumb, started out as an urban NPS pollution prevention education program, but has expanded to address all types of NPS pollution in all areas of the state. It is based on the premise that people who understand and appreciate aquatic systems will naturally work to protect them. Through several methods, the Blue Thumb program provides citizens with education about stream ecology, the effects pollution on the streams and methods of reducing the amount and effects of NPS pollution to waters.

Wherever possible, Blue Thumb uses volunteers to educate the public about preventing water pollution. After they themselves have been educated and trained, volunteers monitor streams, screen groundwater, present pollution prevention programs, and mark community storm drains with the *"No Dumping ~ Keep Our Water Clean"* message.

All kinds of people become Blue Thumb volunteers - teachers, students, farmers, ranchers, 4-H leaders and members, scouts and scout leaders, retired folks, or anyone with an interest in clean water and healthy aquatic systems.

Water Quality staff also present a variety of programs within the public schools and universities to educate students on stream ecology and on the effects of pollution on streams. A two credit hour upper division class on pollution ecology is offered through Northeastern State University at the Tahlequah and the Broken Arrow campuses.

Our implementation efforts for demonstrating effective best management practices (BMPs), which include such things as terraces, grassed waterways, riparian zone establishment and management, animal feeding areas and many other similar practices to abate NPS pollution, are primarily directed to Priority Watersheds. A priority watershed is one that the state as a whole

deems especially in need of pollution prevention measures, either because it is impaired or because it is of high quality and warrants special protection. Section 319 of the Clean Water Act provides funds each year to install enough BMPs throughout one, or occasionally two, priority watersheds to effectively demonstrate to the citizens within or near the watershed(s) appropriate practices to protect the watershed. There is never enough money to completely fix a watershed's problems, but there is enough to begin the process and demonstrate the steps needed to fix the problem. Requiring producers to pay part of the cost of these BMPs stretches federal dollars. The state also contributes funds to these efforts.

Priority watershed implementation programs generally last 4 years. For this period of time, OCC Water Quality Division supervises a watershed coordinator who assesses need, writes farm plans and nutrient management plans on each individual operation, and generally sells the program that has been devised to fix the problems in the watershed. The watershed coordinator works very closely with a watershed education specialist. Together they demonstrate the problem and the solution to watershed residents.

Within priority watersheds, where most of the agricultural BMPs are demonstrated, educational programs are instituted that are tailored to the specific problems of the watershed. A volunteer monitoring program for the Watershed is usually established, and additional educational events directed at the adults of the watershed will also be planned and implemented.

The Conservation District(s) in the priority watershed are invaluable partners. Their Board members are often the most influential farmer/ ranchers in the area and their staffs are usually on a first name basis with the watershed's agricultural producers. Both the watershed coordinator and the education specialist are housed in district offices and they work hand in hand with the district personnel. Without the buy in of the Conservation Districts, these programs would have little chance of success.

The other environmental program overseen by OCC is the state wetlands program. In May of 1990, the Oklahoma Legislature directed the Oklahoma Conservation Commission to develop a wetland management strategy for the state. A draft plan was set forth then reviewed and enhanced by private landowners; interest groups; and local, state, and federal entities. The strategy entitled *Oklahoma's Comprehensive Wetland Conservation Plan* was completed in July 1996. The strategy focuses on voluntary measures for wetland protection.

Plan development led to a framework in which an interagency working group, led by the Conservation Commission, could work to preserve, enhance, and restore the quantity and biological diversity of Oklahoma's wetland resources. This interagency working group is comprised of tribal, state, and federal entities that have an interest and/ or regulatory responsibility toward wetlands.

Oklahoma's Comprehensive Wetlands Conservation Plan promotes private and public cooperation in managing wetlands. This is a voluntary approach using education, technical assistance, and incentives to bring the private and public sectors into wetland management as willing partners. Project funding is a combination of federal and state dollars in conjunction with the commitment of private landowners.

The Conservation Commission, as well as other wetland agencies in Oklahoma, has a variety of ongoing wetland projects to meet the goals and objects of the state strategy which are funded through the Wetlands Program of the Environmental Protection Agency. The ultimate goal of each project is to provide landowners, students, and agency personnel commonsense approaches to wetland issues through education, demonstration and restoration. Projects have included the development of wetland monitoring methods, development of wetland restoration methods and wetland restoration, construction of wetland outdoor classrooms and many wetland presentations to public schools and public school teachers.

A Responsible Regulatory Balance

Jeff Cloud, Oklahoma Corporation Commissioner

My Job

When it comes "Pursuing a Responsible Balance" with Oklahoma's environment, the theme of this event, I can't think of any state agency, board or group that has that responsibility more intertwined with its daily functions and goals than does the Corporation Commission, where I serve as a commissioner.

That is not said to downplay the responsibilities of any other agency or group. But one need only scan the duties of the Corporation Commission to realize how critical and necessary that balancing is to achieving the commission's responsibilities.

The Commission

The Commission regulates Oklahoma oil and gas exploration and production; many electric, gas, telephone and even some water utilities across the state; a large share of Oklahoma's trucking industry; petroleum storage tanks; gasoline filling station pumps for accuracy in dispensing correct amounts of fuel, and for fuel quality and accurate octane ratings; oil, gas and petroleum product pipeline safety; and even railroad crossings and cotton gin activities.

Even that list doesn't cover the full extent of the Corporation Commission's responsibilities.

But especially in the area of regulating oil and gas drilling and production, Class II injection wells and overseeing compliance with pollution prevention standards for below-ground and above-ground petroleum storage tanks and retail fuel distribution systems, it is clear that protecting the environment is a constant high priority.

There are about 3,000 oil and gas operators in Oklahoma, and the state encourages and benefits greatly from the petroleum industry operating at a high level of activity — providing lots of jobs, income and tax revenue. But throughout most of Oklahoma (the exception being Osage County), no one drills an oil or gas well without first getting a permit from the Corporation Commission. About 5,100 drilling permits were issued in 2003, up a full 1,000 from 2002. And before a permit is granted and before any drilling begins, the commission's technical department reviews the plans to ensure that they will protect fresh water formations and that the proposed well is at an acceptable location.

While the state Constitution assigned many responsibilities to the Corporation Commission, regulatory authority over the petroleum industry was not one of them. In 1913, a new law gave the Commission regulatory and enforcement authority over some issues related to certain problems with the state's natural gas production. The commission subsequently issued orders to prevent wasteful production of oil and gas, requiring dry or abandoned wells to be plugged to protect fresh water and to prohibit letting oil and gas "leak or escape from natural reservoirs, wells, tanks, containers or pipes."

A 1933 law gave the commission greater enforcement authority to set the Corporation Commission as the main regulatory agency overseeing Oklahoma petroleum industry activity.

In the decades since, laws, rules and regulations affecting the commission's oversight and control of oil and gas drilling and production have changed. But always while the commission was charged with assisting the petroleum industry with determining where and how to best drill wells, the agency also has had to balance economic and

resource development interests against the protection of the surface lands, streams and lakes and subsurface aquifers and potentially productive geologic formations.

Since this state's first oil well was successfully drilled near early-day Bartlesville in 1897, an estimated half a million wells have been drilled in Oklahoma. No records existed for many of the early wells. Nevertheless, the Corporation Commission remains responsible for dealing with environmental issues relating those old wells, whether they are recorded wells or old abandoned unrecorded wells that someone learns about after oil, gas or saltwater purges to the surface of what might have been thought to have been unpenetrated ground.

Our Inspectors

The commission has about 50 field inspectors working across the state. But considering the half million or so wells over the past century and the more than 2,200 new wells completed in 2003 alone, the scope of their responsibility is somewhat daunting. Within their assigned areas, each inspector is responsible for checking active wellsites for leaks, compliance with commission environmental regulations and required testing and witnessing certain activities, such as well pluggings. At inactive and abandoned wellsites, inspectors also look for leaks, trash, debris and any sign of environmental problems.

Where problems are found at active wellsites, field inspectors have authority to issue citations and generate enforcement actions that can lead to commission hearings and fines that sometimes reach hundreds or even thousands of dollars, depending upon the violations.

To help ensure monies are available to plug their wells after their productive life is over or if the wells are dry, oil and gas operators must post "surety" with the commission. That surety is a kind of environmental protection insurance in the form of a redeemable bond, cash or financial statement showing funds that can be attached or ordered used to properly close wells and clean up sites if an operator otherwise would fail to do so.

The OERB

But in the case of oil field sites that are abandoned or where the operator can no longer be located or has gone gone out of business, field inspectors can take steps either to place the wells on a list of holes to be plugged using state funds or to report the locations to the Oklahoma Energy Resources Board. The OERB then has the job of doing a cleanup using monies from a program funded entirely with money generated from oil and gas producers and royalty owners. Since the OERB was created by legislation about 10 years ago, more than 5,500 oil-field sites reported by commission inspectors have been cleaned.

Wells and Rigs

Today Oklahoma has about 83,000 oil wells and more than 34,000 gas wells listed on the records as active and/or unplugged and capable of producing. Oklahoma's total oil production in 2003 was about 65 million barrels, but that was down from 91 million barrels 10 years earlier and marked the lowest oil output since 1913. That doesn't mean Oklahoma is running out of oil but it is running out of the easiest-to-find and easiest-to-produce oil. Since that first well in 1897, Oklahoma has produced about 15 billion barrels of oil. Although the average well in Oklahoma produces only a little more than 2 barrels of oil per day, higher prices during the past year not only have stimulated new drilling but also have helped to maintain production from many wells that otherwise would be too marginal or uneconomic to continue operating.

If field inspectors or landowners report petroleum or saltwater leaks or related pollution from a well, pipeline or tanks on a property, commission field inspectors not only can trigger actions that can lead to fines, but they also can take actions to lock down the well and stop production until the well operator or owner cleans up the pollution or complies with commission rules. Such enforcement authority gives the commission strong leverage over oil and gas operators who have been found wanting in terms of compliance with environmental protection rules and regulations.

Where petroleum producers find oil, they generally also find saltwater, creating another issue where the Corporation Commission must balance economic and industrial issues with environmental protection.

Underground Injection Control
The Corporation Commission's Underground Injection Control program employees oversee roughly 11,400 underground injection wells in Oklahoma that fall within the EPA's Class II category. Usually these are depleted oil wells into geologic formations that now can accept saltwater or liquid wastes from drilling or production operations that can be stored in the same rock pores that used to hold the oil now gone. Of the roughly 11,400 injection wells, about 200 are commercial wells where petroleum producers can pay to have saltwater from their oil wells pumped back deep into the Earth into formations that have been determined by experts to be safe places to hold saltwater away from anyplace where it would ever come into contact with fresh water or do any harm.

The remaining more than 11,000 Class II underground injection wells belong to petroleum operators themselves and are used either to permanently dispose of their produced saltwater or to inject saltwater under pressure into an oil-bearing formations to drive the petroleum to a producing well or wells. Again, to protect fresh water aquifers from harm from injected saltwater or drilling muds, the commission regulates not only the siting of wells to avoid hydrologically-sensitive areas or zones but also the design, injection volume reporting and periodic testing of such wells to ensure downhole integrity.

Storage Tanks
Environmental protection while also encouraging industrial activity is also a balancing that goes on daily in the Corporation Commission's Petroleum Storage Tank division. Filling station operators and others statewide have more than 10,000 underground storage tanks. The commission is responsible for making sure these tank owners and operators comply with federal and state standards for leak detection, leak reporting, tank system design and installation.

To that end, the Corporation Commission has more than 20 fuel inspectors who travel the state conducting both spot inspections and scheduled inspections of fuel tanks and pumping systems at filling stations and other tank facilities under commission jurisdiction.

Pipelines
In another key area, the Corporation Commission has jurisdiction over more than 300 intrastate gas gathering, transmission, and distribution pipeline operators and 10 intrastate hazardous liquid pipeline operators. Combined, there are more than 40,000 miles of pipeline subject to the commission's jurisdiction. The Pipeline Safety Department administers the commission's intrastate regulatory program to assure the safe transportation of natural gas, petroleum and hazardous materials by pipeline.

Public Utilities
Even in the area of regulated public utilities, the Corporation Commission deals with issues that ultimately involve pursuit of a responsible balance of business interests with environmental interests. For instance, left unattended, trees and other vegetation under or in the path of electric utility lines can result in damage to electric lines and power outages. As a result, the commission earlier this year adopted new Oklahoma electric reliability rules requiring electric utilities to have vegetation management plans and report to the commission on vegetation management and tree trimming practices.

So, clearly in areas ranging from oil and gas drilling and production and storage tanks to pipeline safety and utilities, the Corporation Commission is a state agency where striving to achieve a responsible balance between protecting the environment and assisting and encouraging industrial development is an every-day, ongoing activity. The Corporation Commission is charged with doing both, and we take those responsibilities very seriously.

Regional Environmental Protection Agency

Richard Greene, Regional Administrator, EPA Region 6 (OK, NM, TX, LA and 66 Tribes)

Region 6, of the U.S. Environmental Protection Agency (EPA) is headquartered in Dallas, Texas, Region 6 encompasses an ecologically, demographically, and economically diverse five-state region of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas, as well as 66 Indian Tribes. The Region's vision is "To Meet the Environmental Needs of a Changing World."

Economic and Policy Analysis

EPA's regulations and policies define the technical, operational, and legal details of many of the Nation's environmental programs. Each year, we issue hundreds of rules and policies—some routine and noncontroversial, others dealing with complex, cutting-edge scientific issues or generating major economic benefits and costs. The quality of the analyses on which we base our decisions and the clarity of policies and regulations we develop determine how well environmental programs actually work and achieve health and environmental goals.

Sound economic and policy analysis builds the foundation for EPA to meet its goals and use its resources wisely to do so. To ensure that EPA uses sound analysis in developing priority regulations and guidance, we have adopted procedures to leverage cross-Agency expertise, emphasize early analytic planning, promote option development, and encourage timely management involvement.

A recent review of our process for developing regulations found our current system to be well designed, but recommended several improvements, including strengthening economic and science analysis, considering a broader range of options, and increasing management attention. To address these recommendations, we have developed a strategy for improving our internal processes. In particular, we will emphasize sound economic and policy analysis by continually investigating emerging analytic approaches and adopting them as appropriate, fostering consistent techniques across Agency programs, and ensuring that appropriate environmental results are achieved cost-efficiently. In addition, we have named an Economics Advisor who will work across the Agency to ensure that EPA uses the best economic science to support Agency regulations, policies, procedures, and decisions.

Achieving Environmental Results

Sound economic and policy analysis supports EPA's continuing efforts to quantify the benefits of its air, land, and water regulations, policies, and programs. For example, determining the value of ecological systems and the benefits of preserving these systems will be critical in our work toward healthy communities and ecosystems.

Sound economic and policy analysis will also support EPA's goals for promoting stewardship and improved compliance by fostering consideration of such nonregulatory approaches as voluntary programs, innovative compliance tools, and flexible, market-based solutions. Sound analyses help gain support for Agency decisions, allowing us to implement regulations, policies, and programs effectively and efficiently. In addition, our analysis of issues and priorities established under statute or by executive order that cut across Agency programs— such as small business and unfunded mandates—help us better understand the economic effects of various approaches and ensure that we use the Nation's resources wisely.

Carefully allocating resources is particularly important today, as many states face severe budget constraints.

WHAT WE INTEND TO ACCOMPLISH
Our strategy for improving EPA's regulatory and economic analysis addresses several objectives: (1) to enhance the quality of Agency decisions; (2) to refine our analytic tools and capabilities and factor new analytic information into Agency rules and policies more effectively; and (3) to address priorities. To accomplish these objectives, our strategy emphasizes analytic planning, management involvement, cross-office participation, and public input.

Economic Revitalization & Environmental Restoration
The City of Oklahoma City has received three EPA grants to aid in the revitalization of the "Eastside Reinvestment Area" (ERA). The area is east of the rapidly rejuvenating central City, and has not shared in that economic success - in part because of environmental challenges such as Superfund and brownfield sites. The City's Planning Division, the University of Oklahoma's College of Architecture, and local business and political leaders have united to incorporate site reuse into the larger context of the surrounding community and identify multiple opportunities for redevelopment within the area. A'"charette" (a rapid, group decision-making process) was recently held to aid in the development of site plans for the ERA. There are four neighborhoods or transportation corridors that are part of this ambitious program. Two will have African-American cultural/historical/business aspects, one will be the "gateway" to the planned Native American Cultural Center, and the last will be a recreational area for the local neighborhoods (football and soccer fields, band shell, basketball courts, etc.). At a recent City Council briefing, the proposed plans were very well received. A full Council vote on changes to Comprehensive plan will take place in the near future.

Cimarron Center Redevelopment Project, Sand Springs, Oklahoma, May 2004
Overcoming daunting delays and obstacles, the diverse partners of the Cimarron Center Redevelopment Project located in Sand Springs, Oklahoma, transformed a former zinc smelter site, which had laid dormant for 14 years into a vibrant commercial development anchored by a new Wal-Mart Super Center. The project also helped give birth to the Oklahoma's Brownfield Program.

It took eight years and ten months to cleanup and redevelop the 30 acre site. The project costs exceeded $24 million and included more than $2.5 million for remediation, and $2.2 million in infrastructure improvements. The project created 350 new jobs.

The property had great commercial/retail redevelopment potential. It is located in an underserved area at the intersection of two major highways, one of which provides the only access across the Arkansas River west of Tulsa. The cleanup and redevelopment of the property was accomplished through a network of partners who were dedicated to the project. The responsible party and site owner (Federated Metals) funded and conducted the cleanup of the site in conjunction with the developer (Kucharski Development Company). The development's footprint (building pads and parking lots) serves as part of cleanup remedy, providing the final cap to the site. The city provided its first Tax Increment Financing District for the site to help reimburse the developer for the improvements to the infrastructure that were associated with the project. The development's anchor (Wal-Mart Stores, Inc.) completely changed its site evaluation process to consider the property for a Super Center location.

The 30 acre site was the home of a zinc smelter for over 60 years. The smelter closed in 1985, and the property sat vacant until its redevelopment potential was recognized. The smelter was closed under the Resource Conservation and Control Act (RCRA); however, the RCRA closure did not address the "pre-RCRA" wastes that were on site.

The site owner, entered a Consent Agreement and Final Order with the Oklahoma Department of Environmental Quality to voluntarily investigate and remediate the property in October 1994. It

then began the process of characterizing the site environmental conditions.

During the voluntary cleanup and brownfield redevelopment, all the waste on site was addressed as well as the wastes discovered in an adjacent neighborhood (total of 61,300 cubic yards of contaminated material). The adjacent residential neighborhood, where smelter waste had been used as fill, was remediated first, followed by the site cleanup. In total, approximately 40 acres of contaminated soil and smelter waste were remediated (on 30 acres site and on 91 adjacent residential neighborhood properties). The waste and contaminated soil was disposed in an on-site engineered disposal cell, which is located under the new commercial redevelopment.

A major project delay was the need for brownfield liability release for the developer, lenders, tenants, etc., which required legislative action. The project partners enlisted the assistance of state legislators to sponsor Brownfield legislation for the State of Oklahoma. The Oklahoma Brownfield Voluntary Redevelopment Act was passed in April 1996, and the redevelopment project began to move forward.

The needs of this project helped give birth to Oklahoma's Brownfield Program. The Oklahoma Department of Environmental Quality also began working towards a Brownfields Memorandum of Agreement with EPA Region 6 to provide assurances that EPA would not pursue the site under CERCLA while the cleanup project was in the state Brownfield Program or after the site was remediated. EPA and DEQ signed the MOA in April 1999. Additionally, since 1995, EPA has provided more than $1.8 million of funding to support the Oklahoma Brownfields Program.

Another major delay occurred during the corporate takeover of the owner's company. Delays also occurred for the desired anchor retail store to evaluate property and the environmental liability issues prior to agreeing to locate on the property. The site was remediated and pad-ready in August 2001. Wal-Mart held its Grand Opening Ceremony in August 2003.

The new retail store quickly out-performed the economic projections and is providing huge increases in tax revenues of the City. The existence of the project has increased the interest of developers in the area. The City of Sand Springs is concentrating its Vision 2025 funding in the area. Vision 2025 is funded by a one penny, thirteen-year increase in the Tulsa County Sales Tax and is specifically targeted to fund development and capital improvements throughout the county.

Sand Springs will be allotted $14.5 million to improve the Sand Springs Keystone Corridor, including the acquisition of land and preparation of the land for modern commercial development. Sand Springs' involvement will stimulate private investment in the area, support the school system, encourage new retail shopping along the corridor and improve the appearance of the community, which will entice additional tourism.

The massive economic development potential that Sand Springs has acquired is the direct result of the developer's vision and the willing assistance of its partners "to do what it takes to get the job done." The developer was recognized for its partnership building in 1998 with an EPA Region 6 Environmental Excellence Award.

This project is an excellent example of people and organizations from diverse backgrounds learning to speak each other's professional language and step outside their normal routines and thought patterns to make a project happen.

Source: US Environmental Protection Agency, 2003-2008 EPA Strategic Plan - Direction for the Future

Our Vision: "Harmony between People and the Land"

M. Darrel Dominick, State Conservationist, USDA – NRCS, Stillwater, OK

The Natural Resources Conservation Service's (NRCS), the conservation agency of the United States Department of Agriculture (USDA), vision is "harmony between people and the land." NRCS in Oklahoma has worked with the Oklahoma Conservation Commission (OCC), 88 local conservation districts, nine Resource Conservation and Development (RC&D) Councils, and other conservation partners "pursuing a responsible balance" since the Dust Bowl of the 1930s.

This local, state, and federal interface has worked to "provide leadership in a partnership effort to help people conserve, maintain, and improve our natural resources and environment." Other conservation partners include the Oklahoma Association of Conservation Districts (OACD), Oklahoma Association of RC&D Councils (OARC&DC), Oklahoma Association of Conservation District Employees (OACDE), Oklahoma Grazing Lands Coalition Association (OGLCA), and the Oklahoma Tribal Conservation Advisory Council (OTCAC).

These partners believe in seeking common ground among various stakeholders and approaching natural resource issues in a voluntary manner in implementing science based conservation practices.

The locally led conservation model of these efforts can be illustrated as follows:

The following will provide information on the past, present, and future of these efforts.

The success of the partnerships is shown in the recently published "Out of the Dust – The History of Conservation in Oklahoma in the 20th Century". An excerpt from this book provides readers with the beginning of the modern conservation/ environmental movement -

"April 14, 1935, started as a bright, brisk spring day. It would come to be known as""Black Sunday." In the afternoon a huge, black cloud swept across western Oklahoma blocking out the sun and reducing visibility to a few feet. Some thought it was the end of the world….".

The "energy" from this event prompted local, state, and federal leaders to become active problem solvers.

Today, the NRCS approaches conservation challenges by examining the components involved as follows: **SWAPAH**

- **S**oil – soil erosion; soil quality; carbon sequestration…
- **W**ater – quality (sediments; nutrients…); quantity (upstream flood control; irrigation; drought; plant uptake…)…
- **A**ir – quality (smell; dust)…
- **P**lant – native; introduced; invasive; weedy; Eastern red cedar; Salt cedar; various thistles…
- **A**nimal – livestock; wildlife

- **H**uman – coordinated resource management through locally led efforts; partnerships; voluntary; diversity/demographic changes…

The NRCS provides technical and financial assistance through a variety of authorities and conservation programs. The 2002 Farm Bill, signed by President Bush in May 2002, provides authorization and commitment to what is being called the "second golden age of conservation." The following programs are offered:

- Conservation Technical Assistance (CTA) – Provides natural resource inventories and assessments, planning assistance and technical assistance in applying conservation systems. In 2003, approximately 190,000 Oklahoma customers received CTA.

- Resource Conservation and Development (RC&D) – RC&D activities help people in rural areas plan and carry out initiatives that increase conservation of natural resources, stimulate and support economic development, and enhance the environment and standard of living in local communities. In 2003, the nine RC&D councils completed 145 projects, assisting 523,587 citizens and communities. Approximately $100 million was leveraged to assist these efforts.

- Small Watershed Rehabilitation - NRCS and local sponsors have constructed 2,098 upstream flood control structures since 1948. No other state has more structures than Oklahoma. These structures protect communities and agricultural enterprises from damaging floods, provide sediment control, often provide municipal water (42), and recreational areas. Many of the dams are at the end of the 50 year design life and are eligible for rehabilitation (upgrading and extending the project's life). By 2015 over 50% of the structures will need some type of rehabilitation.

- Earth Team Volunteer Program – In 2003, 1,559 people volunteered their services for 93,365 hours. These citizens got involved in helping to get conservation on the land.

- Oklahoma Outreach Program – In 2003, there were over 360 outreach meetings and 2,959 news articles to get the word out about services and opportunity. This reached over 6 million people. This outreach is provided in a non-discriminatory manner to all Oklahomans needing assistance.

- Various Cost Share Programs – NRCS offers financial assistance (cost share assistance) to landowners to establish conservation systems on the land. The following programs are offered: Environmental Quality Incentives Program (EQIP – 2003/ 952 contracts on 345,000 acres; $10.7 M in financial assistance; 2004 - $19 M); Emergency Watershed Protection (EWP – 2003/ over $11 M to remove debris from streams and protect bridges; property protected estimated at over $360 M); Grassland Reserve Program (GRP – 2003/ $2.5 M for easements and rental agreements); Farm and Ranch Lands Protection Program (FRPP – 2003/ $1.66 M for easements to keep land from conversion to non-agricultural uses); Wildlife Habitat Incentives Program (WHIP – 2003/ $500,000 resulted in 50 contracts); Conservation Security Program (CSP – "reward the best, motivate the rest"; establishes a tier system for incentive payments to keep conservation systems on the landscape) and the Wetlands Reserve Program (WRP – 2003/ $4.6 M; currently have almost 50,000 acres enrolled).

To close, NRCS is looking to expand the technical workforce through technical service providers (TSP – private sector) and to continue to be a conservation partner enabling active problem solving. Three to five generations ago, members of our families and communities made decisions and took actions to stop the Dust Bowl. That has impacted us today. The decisions and actions we

The U.S. Geological Survey: Emerging Contamination Issues

Kim Winton, PhD, District Chief, Oklahoma Water Resources Division, U.S. Geological Survey

The U.S. Geological Survey (USGS) serves the Nation as a scientific federal agency that collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems. Because the USGS has no regulatory or management role, the USGS provides impartial and objective science that serves the needs of our changing world. The diversity of scientific expertise enables the USGS to carry out large-scale, multi-disciplinary investigations that build the base of knowledge about the nation's resources.

In turn, decision makers at all levels of government—and citizens in all walks of life—have the information tools they need to address pressing science issues. The USGS works in a cooperative manner (typically a cost-share program) with state and county agencies, tribes, and cities, as well as, other federal agencies in monitoring and interpretive studies. Sample collection, measurements, and analysis methods are consistent nationwide, which makes USGS data bases a valuable resource for comparing conditions across state lines.

USGS streamflow data are available to the public and much are'"real time" (can be viewed on the internet within 4 hours of being collected at httP// waterdata.usgs.gov/nwis/rt). USGS water-quality data are available at http://waterdata.usgs.gov/nwis .

To manage and protect water resources, monitoring is necessary to understand the baseline conditions (beginning point), and be able to evaluate whether degradation, improvement, or no change has occurred. Management, protection, and monitoring should be considered with regard to both quality (contamination) and quantity of a resource. It is important that samples and measurements are collected by a consistent method using established protocols and analytical methods that have the appropriate quality-assurance standards. It is important that the data are of high quality and are comparable over many years.

As the Academy considers management and protection of water resources, it is suggested that they review the USGS publication, Circular 1265, entitled "Water Quality in the Nation's Streams and Aquifers – Overview of Selected Findings,

1991-2001." These data were intended to provide information to design and implement strategies for managing, protecting, and monitoring water resources in many different hydrologic and land-use settings nationwide:

- Support development of regulations, standards, and guidelines that reflect actual contaminant occurrence, including contaminant mixtures, breakdown products, seasonal patterns, and variability among different settings;

- Identify key sources of non-point pollution in agricultural and urban areas;

- Set priorities in geographic areas and basins in which water resources and aquatic ecosystems are most vulnerable to contamination and where improved treatment or management can have the greatest benefits;

- Improve strategies and protocols for monitoring, sampling, and analysis of all hydrologic components, including the atmosphere, surface water, ground water and biological communities;

- Contribute to state assessments of beneficial uses and impaired waters (Total Maximum Daily Loads or TMDLs), strategies for source-water protection and management, pesticide and nutrient management plans, and fish-consumption advisories; and,

- Sustain the health of aquatic ecosystems through improved stream protection and restoration management.

This circular can be obtained on the World Wide Web at: "water.usgs.gov/pubs/circ/2004/1265/". It will provide the Academy with many thought provoking ideas and relevant examples in monitoring applications for management and protection of water resources.

There is no resource more precious or vital to Oklahoma residents than water. The presence of contaminants in our water is not new. The ability to measure pesticides or nutrients in water has long been established. As technology to measure other contaminants, such as emerging contaminants that include hormones, pharmaceuticals, and certain bacterial strains, improves, it is now possible to evaluate the potential effects of these compounds including deterioration of certain species in our ecosystems, decreased biodiversity, antibiotic resistant bacteria, and hormones and pesticide degradates in our drinking-water sources. Protection of the surface water and ground water is paramount to a healthy environment for both human needs and support of local ecosystems.

Much of water monitoring is based on regulatory needs. That is, samples are collected to determine: (1) if a contaminant or bacteria is above a certain concentration that is known to be deleterious to humans, (2) if phosphorous and nitrogen concentrations that cause algal blooms can be toxic to fish and/or cause taste and odor problems, and (3) long-term water quality to help EPA establish levels for certain pesticides that should be considered potentially hazardous when compared to a certain maximum contaminant level (MCL).

Just because a compound is not regulated, does not mean it is not important. There are relatively few "emerging contaminants" such as hormones, pharmaceuticals, growth regulators, antibiotics, and antibacterials that are regulated in the United States. Historically, in the pesticide industry, pesticides were regulated first in Europe, then several years later, were regulated in the U.S. Europe has recently started regulating for compounds that might be associated with confined animal feeding operations (CAFOs) such as growth regulators and antibiotics. Establishment of "baseline" information for Oklahoma is needed so that effects on water quality from increased numbers of CAFOs, wastewater-treatment plants, and other potential sources of these emerging contaminants can be evaluated. Basically "what goes in, must come out." So whatever is being consumed or used by animals or humans (hormones, antibiotics, preservatives,

antibacterials, pesticides, contraceptives, and breakdown products of these compounds) is being returned to our environment through point sources (wastewater discharge to streams and rivers), and non-point sources (animal waste, pesticides, or nutrients as runoff in a stream, land application of lagoon waste, or storm runoff).

The environmental effects of many of these compounds alone, or in combinations, are not known. There are reports of effects such as frogs with extra limbs, feminized fish, mortality, and lack of reproduction of species of mussels, but little is known about what caused these effects. Most of these compounds occur in mixtures. For example, in a USGS water-quality study in Hawaii (1991-2001), 53 percent of the samples from public-supply wells contained volatile organic compounds (VOC) and pesticides, some samples contained as many as 10 different pesticides. Nationally, about 15 percent of samples collected from urban streams contained at least 10 VOCs, and 23 percent contained 10 or more pesticides. The possible cumulative effects on humans and the aquatic health from low concentrations of multiple compounds are unknown.

Oklahoma has become more aware of water-quantity issues in the last few years as the state embarks on decisions with tribal compacts and ownership issues, potentially selling water to Texas and potentially selling water within the state from the Arbuckle-Simpson aquifer. Maintaining the long-term data measurements at stream gages (streamflow and water quality) and records is of paramount importance. Oklahoma historically goes through about 20-year drought and wet cycles, and the institutional memory of the decision makers changes within that time frame. For example, USGS is implementing studies in cooperation with OWRB to make decisions on how much water can be pumped from the Arbuckle-Simpson aquifer without having a negative effect on the springs and rivers. However, the results of the study about how much water can be pumped is going to be based on intermittent historical streamflow data and on data collected during the last 20 years mostly during very wet weather. Additional long-term data collected during both wet and dry long-term weather patterns are included to improve the accuracy of study results, and this additional monitoring is part of the studies being implemented. Long-term measurements and records are needed to understand "baseline," and evaluate changes over time. It is important to have a long-term database to be able to determine if the change is a long-term trend or simply a short-term fluctuation.

The interaction of the surface water and ground water, and the effect on water quality and quantity needs to be better understood. Because water laws in Oklahoma treat the ground water as a land owner's property and the surface water as a common commodity, there has been little emphasis on doing the research to understand the critical interaction of one water source with the other. The USGS in cooperation with the Oklahoma Water Resources Board, U.S. Environmental Protection Agency, Oklahoma Geological Survey, and Oklahoma State University is constructing a numerical model to simulate flow in the Arbuckle-Simpson aquifer. This will be one of the first major steps toward better understanding of the effects of the surface water/ground water interaction on water in the aquifer.

Nationwide USGS studies confirm that long-term, systematic, and consistent monitoring is essential for distinguishing trends from short-term fluctuations, to anticipate unintended consequences, and choose cost-effective management strategies. Many of the monitoring stations (surface-water gages, water-quality stations, and ground-water wells) are implemented for a relatively short-term need or study, and many are discontinued as a result of reduced budgets. If collection of data to aid decisions for management and protection of water resources is the goal, long-term commitment of resources to maintain and operate critical monitoring networks of surface-water gages and ground-water wells is needed.

The U. S. Army Corps of Engineers: Pursuing Balance

Stephen L. Nolen, Chief, Environmental Analysis and Compliance Branch, Planning, Environmental, and Regulatory Division, Tulsa District, U.S. Army Corps of Engineers

On March 26, 2002, coincident with dedication of the Davis Pond Fresh Water Diversion Project in Louisiana, Chief of Engineers Lt. General Robert Flowers emphasized the U.S. Army Corps of Engineers (USACE) commitment to the environment by formalizing a set of "Environmental Operating Principles" (EOPs) applicable to all agency decision-making and programs.

These seven principles provide emphasis and direction for all Corps employees on how to better achieve stewardship of land and water resources while recognizing the connectivity and interdependence among water resources projects, economic development, protection of ecological health, well-being of citizens, support to the military, and matters pertaining to the Nation's security.

At the heart of these principles is the recognition that environmental sustainability and economic development can co-exist and are not necessarily mutually exclusive when projects are consciously formulated to work with nature and are, to the degree possible, modeled after it. A complete listing of these environmental principles can be reviewed at'http://www.usace.army.mil.

In light of the 2004 Oklahoma Academy's theme of "Oklahoma's Environment: Pursuing a Responsible Balance", the third principle of the Corps' EOPs would seem particularly appropriate as a focal point for discussing the Tulsa District's role in addressing this theme:

3. ***Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.***

When implemented in concert with the other six, this principle allows the Tulsa District and its customers to realize the economic benefits of the vast diversity of USACE missions while, at the same time, serving as national leaders in environmental and natural resources stewardship for present and future generations.

The Tulsa District

The Tulsa District Corps of Engineers was established in 1939 on the heels of great economic and environmental extremes: the drought of the 1930s and the devastating flood of 1936. These events helped to quickly establish a strong problem-solving bond among citizens and local and federal governments – an alliance that persists today after nearly 65 years of service to Oklahoma, southern Kansas, and northern Texas.

The result has been formulation and construction of a diversity of projects under the Tulsa District's civil works and military programs. Under civil works, the Tulsa District has constructed and operates 38 water resource projects in support of navigation, flood control, hydropower, water supply, and recreation missions.

Included is the McClellan-Kerr Arkansas River Navigation System, the Oklahoma portion of which includes five locks and dams supporting inland navigation of national economic significance. Support to the military provides part of the sustaining base that supports multiple Army and Air Force installations through facility construction, environmental compliance, and environmental restoration.

Given this diversity of programs and business functions, a vast geographic area of responsibility, seemingly competing interests, and the public's desire for both economic growth and

environmental protection, the Tulsa District and its customers are continually faced with the challenges of defining "responsible balance".

Owing to the multipurpose nature of its lake projects, the Tulsa District has the challenging but rewarding job of seeking a balance among all lake project purposes. This is typically accomplished through close coordination among all competing interests such that some degree of compromise is achieved for all resource users and the public.

A good example would be a multipurpose reservoir supporting hydropower generation, flood damage reduction, water supply, water-based recreation, and downstream influences on life requirements for an endangered species. Optimum conditions for lake level manipulations and water release regimes for any one of these purposes in and of itself are often mutually exclusive. Accordingly, guidelines for project operations are derived through close coordination among Tulsa District managers and hydrologists, resource agencies, hydropower interests, water supply users, and the general public.

The result is a plan typically providing benefits to all, though usually not those optimal for any one project purpose. Open communication and application of the best available engineering and environmental science are vital keys to operation of these multipurpose water resources projects.

An appropriate balance in project planning, construction, and operation of USACE projects is also facilitated by compliance with a myriad of environmental laws and regulations governing Federal projects. Processes prescribed by these laws ensure that project decision-makers are afforded adequate information related to environmental, sociological, and economic matters pertaining to Federal actions.

Laws such as the National Environmental Policy Act (NEPA), National Historic Preservation Act (NHPA), Endangered Species Act (ESA), Fish and Wildlife Coordination Act, Clean Water Act, and a host of others ensure that consideration is given to balancing project benefits and impacts. Under the processes prescribed by NEPA, public input and comment is a critical part of decision-making for Federal activities under missions of the Tulsa District. Project input representing diverse views of other Federal and state resource agencies, business interests, special interest groups, nonprofit organizations, and the general public often result in a balance most desirable for these actions.

In recent years, the USACE has begun to employ a more holistic approach to managing the nation's water resources by focusing on watershed planning. This approach recognizes that rivers, lakes, coastal areas, wetlands, and riparian corridors are complex systems that interact with one another in dynamic ways. Through watershed management, the USACE is working to better understand these interactions and to take actions that benefit the entire system, rather than distinct, separate parts of it.

Where possible, the Corps emphasizes non-structural solutions to flood control rather than ones involving dams, levees, and other structural measures. Non-structural solutions may involve modifying how floodplains are used to avoid changes to floodplains that may have negative effects on the environment. Similarly, an emerging mission for the Corps of Engineers is ecosystem restoration – projects which have as their central focus the restoration and improvement of degraded aquatic systems.

In addition to environmental benefits, economic gains and societal advantages are often realized by these projects. Emphasis on watershed planning is evident in the recently-issued USACE civil works strategic plan for fiscal years 2004 through 2009 (released March 2004 and available at http://www.usace.army.mil/inet/functions/cw/hot_topics/cw_strat.htm).

Each year, more than 100,000 construction projects with the potential to affect wetlands and other aquatic resources are initiated in the United States. Through its regulatory program, the Corps strives to allow reasonable and necessary development to proceed while at the same time protecting these valuable resources. A detailed public review process is a critical part of evaluations for proposed permits and determination of what best serves the public interest. For projects that have unavoidable impacts to wetlands, the USACE usually requires replacement wetlands to offset losses.

Finally, recent guidance concerning the Corps of Engineers values, mission focus, and business processes promote activities which result in a doctrine of dynamic adaptability characteristic of a "learning organization". This emphasis on learning is characterized by an ability to apply good science and engineering skills in meeting the challenges of appropriate balance in all mission areas. This doctrine is detailed enough to guide operations, yet flexible enough to facilitate innovation and adaptation. Dialog with customers is identified as critical throughout this doctrine. This emphasis on learning and adaptability is best described by the seventh and final USACE Environmental Operating Principle:

7. ***Respect the views of individuals and groups interested in Corps activities, listen to them actively and learn from their perspective in the search to find win-win solutions to the Nation's problems that also protect and enhance the environment.***

ideas into action

An Education Agenda

Mark Meo, PhD, Research Fellow, Science and Public Policy Program & School of Civil Engineering and Environmental Science, University of Oklahoma

Introduction

One of the tenets of sustainable development is that the current generation should recognize and act upon its moral responsibility to the fate of future generations. How well society can meet this expectation is seen most vividly within the halls of academe, where the lessons of our collective past are used to build the intellectual foundations of the next generation's future. While educational institutions are typically slow to respond to social changes, the multifaceted challenge of sustainability has motivated a new and continuing discussion within higher education and elsewhere about what the proper role of education can be to help our society address its contemporary problems and provide for a prosperous tomorrow.

This is a not a subject that is likely to be resolved any time soon.

For a variety of reasons, which are discussed below, the elements that comprise an effective education for sustainability overlay an ongoing debate about how contemporary educational institutions can more effectively accommodate a rapidly expanding universe of knowledge, emerging and transforming technologies, and the changing demographics of the 21st century population.

Beyond the walls of academe, however, government, industry, and civil society are all under a variety of pressures to find solutions to complex problems that will not await future consensus. Accordingly, innovative approaches to environmental issues have arisen from the public and private sectors that offer instructive contributions to public education and useful insights into ways the educational process can be arranged to foster a more sustainable future. New fields of study, such as industrial ecology, and novel decision guides, such as life-cycle assessment, have become key aspects of society's response to sustainability. Moreover, entirely new industries and technologies have emerged that reflect the fundamental wisdom of sustainability for future success in competitive markets. New governmental programs, such as the federal commitment to a hydrogen-based economy, also underscore the fundamental shift that is rearranging the educational foundations of society.

Oklahoma is now facing the challenge of designing and building a sustainable future, one in which education is certain to perform an important, but currently weakly-defined role.

In this review, we will discuss the factors that are forcing change in today's educational institutions, and the different ways that sustainability concepts have become adopted by innovative private and public organizations.

Next, we will present a conceptual framework that will help clarify the underlying argument, or paradigmatic shift, that has led to various changes in institutional and organizational behaviors. With some elaboration, we shall then employ this framework to explore the implications of society's interest in sustainability within the context of the Oklahoma Academy's smart growth dynamic for attaining a responsible balance.

Forces for Change
Two disparate themes directly influence the way sustainability has been addressed by educational institutions.

The first theme, understanding what sustainability is and how it can be practiced, has occasioned the development of dozens of teaching curricula and campus greening activities in universities and colleges throughout the country. For example, in 1993 Anthony Cortese founded Second Nature, Inc. (see:www.secondnature.org) for the express purpose of creating heightened awareness about sustainability concepts (i.e. interdisciplinary systems thinking, interdependence of environmental values and human ethics, and collaborative learning and problem solving) in higher education, and to facilitate its transformation to incorporate sustainability concepts into its teaching, research, daily operations, and community outreach.

By now, sustainability concepts have infiltrated many, if not all, of the academic disciplines.

Fields such as sustainable architecture are commonly seen in college catalogs alongside sustainable economics and sustainable engineering. In the last decade, many new university degree programs that seek to incorporate these principles into a formal curriculum have been developed at both the master's and doctoral levels.

- Websites, such as Harvard University's Forum on Science and Technology for Sustainability (see: sustsci.harvard.edu/education.htm), list new degree programs and their curricular components.

- The University of Toledo, for example, recently initiated a new PhD program that is jointly offered by the Departments of Chemical and Environmental Engineering, Civil Engineering, and Earth, Ecological, and Environmental Sciences.

In order to prepare business leaders for the future, America's leading business schools have been adopting innovative environmental management programs into their traditional curricula.

Pioneering programs such as the World Resources Institute's BELL (Business-Environment Learning and Leadership) program seek to demonstrate the reciprocal relationship between the need for industry to adopt sustainable practices, and the need for universities to educate future business leaders about the importance of the natural environment to industry. (see:www.wri.org)

While many academic programs, such as Toledo's, stress the need for students to learn novel ways of understanding the interplay of the environment with society, they also argue for the development of the skill sets necessary to design new technologies and systems that can advance sustainable concepts in business and industry. Yet, as evidence of the speed with which modern society is advancing, the private sector has been equally active at addressing similar concerns (BusinessWeek, 2003).

ConocoPhillips, for example, is among a growing number of businesses that voluntarily produce a corporate statement of sustainability that is intended for widespread public review and comment (see: www.conocophillips.com/ sustainable) Echoing the academic approach to sustainability, ConocoPhillips cites its commitment to develop company-wide competencies in integration, stakeholder engagement, life-cycle management, knowledge management, and innovation to attain its goal of sustainable growth in the present and the future.

To achieve these ends, the company has engaged in several internal educational strategies and activities that place a premium on employee learning and application of sustainability know-how. One example is the annual competition held among the firm's business units to achieve the highest level of environmental performance, either in process re-design or new product development.

The public sector has also actively engaged in educating itself about sustainability. States as well as cites have adopted sustainability practices, in part to design their own future, to assume responsibility for maintaining their standards for quality of life, and to remain within regulatory compliance with the federal government (for examples, see Mazmanian and Kraft 1999, and Rabe 2004). Some cities, such as Portland, OR and Chattanooga, TN have received national acclaim for their commitment to sustainable practices. Other cities have become demonstration sites for eco-industrial parks, which are operated in partnership with the U.S. Environmental Protection Agency. Oklahoma has also won national awards and recognition for its achievements in sustainability.

For example, in 2001, OK-FIRST, a weather reporting system that enables emergency management officials to inform people of weather conditions in real time, won the distinguished Innovations in American Government Award from the Ford Foundation and Harvard University's Kennedy School of Government. Moreover, the City of Tulsa has become a closely-watched national leader in sustainability education and practice not only for its expertise in natural disaster mitigation, but also for its skill in building collaborations and partnerships to design and maintain projects and programs that enhance the city's quality of life (Meo et al. 2004).

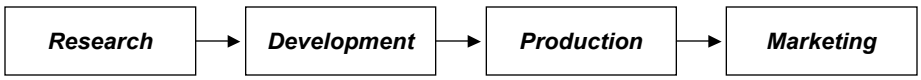
The second major theme influencing education arises from a variety of sources that are increasingly displeased with the current system of higher education, and argue that its cumulative defects warrant significant institutional reforms and reorganization (Schmidt 2004). One line of reasoning points out that disciplinary (over)specialization and the incoherent clustering of courses have led to a serious inability among students to integrate knowledge in a positive and productive manner (Gregorian 2004).

As a consequence, universities are increasingly unable or unwilling to tackle complex social issues, and are endlessly beset by calls to address student deficiencies in different versions of "literacy", including: technological, civic, mathematical, geographical, scientific, ethical, artistic, cultural, analytical, environmental, etc. By itself, high tech is not adequate to resolve these issues.

Though information and computing technology has made great strides in education applications, Vartan Gregorian points out that, "The computer cannot provide an organizing moral framework. It cannot tell us what questions are worth asking." The solutions offered to this problem include: increasing emphasis on multiple disciplines and their interconnections; training educators to work in more than one specialty; emphasize learning by doing more community service; and enhancing the academic prestige of generalists, who practice knowledge synthesis and integration, so that they hold co-equal value to that of specialists.

As a result of rampant growth in knowledge and the overlap among disciplinary boundaries in emerging technical applications, such as biotechnology and informatics, a second line of criticism focuses on the need to redefine the field of academic engineering so it can better provide students with the skills and education to take on leadership roles in both the private and public spheres. Using MIT as an example, Rosalind Williams (2003) points out that engineering has lost its identity among the competing demands of the market for specialization, understanding and applying new knowledge across different domains, addressing social issues, and improving comprehension of complex systems.

In this sense, technological education is moving inexorably toward a liberal arts perspective in which students need to be prepared for life in a



The Pipeline Paradigm

"world where technological, scientific, humanistic, and social issues are all mixed together." Such a hybrid approach to engineering education was recently affirmed by the National Academy of Engineering (2004) which concluded that engineering education must anticipate and adapt to the dramatic changes of engineering practice expected in the coming decades.

The academy argues that future engineers "must be able to acquire new knowledge quickly, be adaptable and engage emerging problems, and also be capable of informing public policy." In this manner, for example, engineers "should be educated to develop sustainable technology and be prepared to communicate ideas and issues to multiple stakeholders, including government, private industry, and the public."

A third line of criticism addresses the fairly widespread failure of academic enterprises, principally universities, to adjust their pedagogical techniques and knowledge delivery systems to the emerging realities of the current information era. Comparing higher education to a supermarket in which courses can be selected by informed student consumers, Ada Demb (2002) has argued that universities can reach a far higher number of target audiences if they were able to reexamine and modify the traditional assumptions by which they operate.

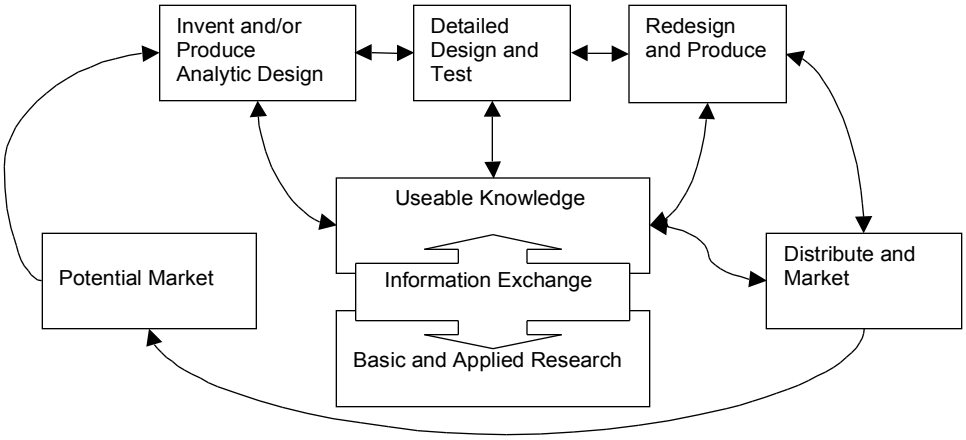
In specific, Prof. Demb suggests that a new model of higher education would recognize that innovative technologies can enable student consumers (customers) to assume a far greater responsibility for what they are learning. Just as consumers assume the responsibility for the nutritional mix of food items they purchase in a supermarket when information is explicit and open, universities should recognize that many students are sufficiently mature to assume the responsibility for what they wish to learn.

With the judicious use of technology, new pathways could be created for obtaining educational experiences, new modes of testing student mastery of subject matter could be developed, and new capabilities for tracking student credit hours could be designed and effectively applied.

A Useful Analogy

For educators, the idea that education is in need of reform is almost a constant refrain heard these days. A problem for those who acknowledge the importance of education for sustainability is determining what set of recommendations is the most appropriate. How can an informed, rational choice be made? What criteria can be used to judge the adequacy of different perspectives and points of view? I would suggest that part of the answer can be found by examining an analogous situation that first appeared several decades ago in the debates over the role of research and development in support of the nation's global economic competitiveness. At that time, critics were concerned that the conventional view of R&D as a "pipeline" process that operated chiefly in a linear and unidirectional mode from basic research to applied research and development to production, and then marketing was fundamentally flawed and misleading (Landau and Rosenberg 1986).

What critics objected to is that the **pipeline paradigm (see figure above)** failed to comport with the historic evidence. Many technological innovations, particularly those designed and marketed by our economic competitors such as Japan, did not necessarily draw upon a deep well of basic research. Rather, many of the global market's better products were built with existing knowledge.



The Chain Linked Model

Even though the United States had amassed a majority of Nobel Prizes in basic research, it did not necessarily mean that the nation would be the leader in new product and process innovations. In addition, the unidirectional nature of the pipeline model was questionable.

Customers and end users of different technologies had become well-known as designers and fabricators of innovative substitutes that met their needs more effectively and efficiently. Technocratic expertise, while important, had to be melded with end user requirements.

Finally, the pipeline model presupposed that advances in research, both basic and applied, would lead inexorably to new technologies that customers valued. This view, known as "technology push" had to be reconciled with the power of competitive markets in determining what might ultimately succeed.

For example, the race between the United States and Europe to build the first supersonic transport was undertaken with very little regard to the market for such a technology. Although the U.S. lost out in this competition, after 27 years of flights, a weak market for expensive air travel ushered in a teary retirement for the British-French Concorde in 2003.

As an alternative, scholars have advocated that the relationship between R&D and the innovation process be conceptualized as a "chain-linked" model in which the interactions among and between various stages of the process are both bi-directional and continuous (Kline and Rosenberg 1986). In this conception, research and knowledge both act as reservoirs into which different stages of innovation search for information.

In contrast to the pipeline model, the chain-linked model is a circular arrangement of five separate stages: Potential Market; Invent and/or Produce Analytic Design; Design and Test; Redesign and Produce; and Distribute and Market, all of which exchange information with one another as well as independently seeking out sources of fresh research and/or usable knowledge.

The **chain-linked model of innovation (see figure above**) is useful when one thinks about the role of innovation in education for sustainability. The model attempts to match the reality of market competition with the continuing need to find new approaches to solving complex problems. By allowing for greater interaction between knowledge providers and users across all the stages of technology development, the model sheds light on how education systems can make more efficient use of their limited resources.

For example, a good number of the recommendations discussed above for reforming education emphasize improving problem-solving and skills for integrating knowledge in a more collaborative setting. While the education system is not directly linked to a competitive market for technology development, the chain-linked model offers some insight about how such a knowledge-sharing, collaborative approach can be taken when a specific goal for sustainable education is made a priority. Although this approach matches our experiences studying green technology development in industry (Meo and Sharfman 2000) and city government, it can also serve as a useful guide for educators to examine the relative roles that research and knowledge can play in the development of sustainable systems.

Whether one is contemplating smart growth, pollution prevention, or green design, the chain-linked model recognizes the importance of local (subjective) knowledge as well as academic (objective) knowledge in the search for viable solutions.

Rethinking Our Approach to Education

One of the notable ways that industry and government have educated themselves about sustainable practices has been to exercise their initiative to develop cross-disciplinary teams that can "brain-storm" more effectively across different business units or agency divisions.

In comparison with higher education, which continues to place a scholarly premium on solitary achievement, the private and public sectors have shown themselves to be far more adept at learning what organizational arrangements work more effectively and applying them on a daily basis. With its reluctance toward academic collaboration, higher education today still provides its clients with graduates who are well-versed in current knowledge and faculty expertise in technical domains that are critical to the economic well-being of society.

But, in order to advance the concept of sustainability further, there are several areas that Oklahoma higher education should re-think.

Organizational Boundaries

First, the intellectual division of labor and physical separation of the state's two leading research and education universities does not adequately address the emerging needs of a sustainable society. As innovative technologies that are rooted in genetic or electronic research (two of many) mature, they will continue to find market applications across a variety of economic and social domains.

The transboundary character of these new technologies means that they cannot be isolated effectively for further study and development at one campus or department, but should be understood as fungible knowledge opportunities that should be widely appreciated by both the land-grant campus (Oklahoma State) and the University of Oklahoma. Advances in information technologies, such as the Oklahoma Mesonet, have made institutional impediments less burdensome, but much more can be done.

For instance, while the wind industry received a boost from the detailed wind power maps created with the collaborative OK Mesonet database, there are other renewable technologies in the state whose development would necessitate greater technical collaboration. Bio-based product development, which is becoming increasingly important in the Great Plains, is likely to become important nationally as more leading companies such as Dow and DuPont switch their feedstock from dependence on petroleum to include renewable resources.

Industry Collaboration

Second, just as the chain-linked model stresses the importance of feedbacks between manufacturers and customers, higher education ought to find ways to work more collaboratively with industry and government. While steeped in intellectual resources, educational institutions have been slow to confront emerging sustainability issues in a manner similar to industry and government.

Closer ties to those arenas whose locus of action is outside academe could prove beneficial to education, particularly in its mission to foster a more vibrant domestic economy and environment. Moreover, stakeholders in business and government are familiar with what challenges are the most pressing, and could improve education's ability to direct its limited resources at issues that are likely to generate shared benefits for all partners.

Cross-Pollination

Third, the application of new technologies can prove surprisingly beneficial to different fields of study. The potential for innovative technologies to engender new ways of addressing problems, even inherently complex ones, can be advanced through a collaborative environment in which ideas and technology, like the proverbial flowers in the field, can be "cross-pollinated" by agents with different points of view.

For example, computer visualization, which has proven to be valuable in architectural settings, can also be applied in environmental planning contexts to enable non-specialists to more readily appreciate what the implications of their technical choices might be. New technologies, which are more transportable and affordable, can facilitate the educational prospects of different groups (beyond traditional K-12) and enhance their participation in government.

Common Vocabulary

Finally, the diffusion of sustainability concepts in higher education will enable academics and non-academics to share a more common vocabulary which should improve the likelihood for effective joint plans and actions. The adoption of sustainable development as a national and regional goal is important to motivate the design of coherent state plans that involve business, government, and academe. Whether successful or not, sustainability education could provide a sound platform against which alternative futures could be usefully and rigorously compared.

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A Research and Education Agenda

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To enact effective sustainability policies and achieve sustainable prosperity, we must have the political will, resources, social support, institutional capacity, and environmental knowledge necessary to inform policy deliberations and motivate compliance with policy outputs.

The most important barrier, perhaps, to the achievement of sustainability is the dearth of accurate information about how sustainability can best be accomplished (or even how to measure it!) and how to get this information out to policymakers and stakeholders so that they may act on it. This chapter considers some of the research and education needs that should be addressed if we hope to move effectively toward sustainable outcomes.

The discussion below is loosely organized along the eight-step cycle discussed in chapter 3 on sustainability.

Natural Science Research Need

In looking at the right side of figure 4 in chapter 3, it is clear a better understanding of the relationships between natural and human systems and how they can be made more sustainable is essential to formulating effective sustainability policies.

This research involves many disciplines in the biological, physical, computational, and applied sciences. More importantly, it requires interdisciplinary research across traditional scientific disciplines to yield insights about the behavior of complex natural systems.

Impacts of Human Behavior on Natural System Structure and Function (Ecosystem Health)

Much research has been accomplished in understanding the structure and function of ecosystems and how human activities affect these systems. However, much more work remains to be done. Specific research topics would require a book all by itself. In the interest of space, I will list only general categories of research needs including the ana;ysis of ....

- undisturbed ecosystem structure and function
- disturbed ecosystems structure and function, with comparison to undisturbed systems
- the propagation of impacts throughout ecosystems
- resilience of ecosystems to tolerate and recover from disturbances
- the efficacy of human interventions to restore damaged ecosytems

Impacts of Changes in Natural System Structure and Function on Natural Capital (Goods and Services)

For sustainability to be achieved, we must acknowledge and understand the important role that human perceptions of the environmental play in their decisions and actions. Paramount among these is how humans value the goods and services that nature provides upon which they rely on to improve their quality of life.

Educators and researchers generally agree that humans do not appreciate the extent to which they are dependent upon ecosystems for their prosperity. Nor do they understand how their actions affect these goods and services. Categories of research needs in this domain include:

- Identification and quantification of ecosystem services (flows) and their capacity changes over time
- Identification and quantification of ecosystem goods (stocks) and their rate of depletion
- Analysis of the relationships between ecosystem structure/function and the provision of goods and services
- Analysis of alternatives to ecosystem goods and services

Technologies and Best Management Practices
Understanding the impacts of human activities on ecosystems and the goods and services that they provide is only the first step toward sustainability. This must be followed by a technical investigation into how these impacts can be mitigated so that human-nature interactions can be made more benign. This requires new technologies and new management practices. Research and education in this domain should address:

- Renewable energy and natural resource supplies
- Energy and natural resource conservation
- Pollution prevention
- Environmental management systems design and implementation (e.g., ISO 14001 and 14004)
- Life cycle assessment and enhancement
- Industrial ecology
- Ecosystem restoration
- Alternative resource development
- Technology transfer

Social Science Research Needs
Social science research and education has suffered from inadequate support when compared to the natural sciences. This lack of attention is remarkable given that sustainability cannot be achieved without human intervention and change in human behavior. This research also requires involvement of several disciplines including decision sciences, behavioral sciences, policy sciences, management sciences, economics, and ethics. As in the case of natural science research, this research also will require interdisciplinary collaboration and synthesis to understand complex human systems.

Valuation of Natural Capital
Rational human action relies on decisions that seek to optimize the benefits of decision outcomes. Public choice, rational choice, and economic theories assume that humans act to maximize their own welfare. Sustainability requires that optimal decisions are based on accurate information about the true value of ecosystem goods and services upon which humans rely to improve their welfare – in short, accurate valuation of natural capital. Research and education needs in this domain include:

- Analysis of factors that influence valuation as well as their relative importance
- Exploration of the utility and validity of various means for – and metrics of – valuing natural capital
- Analysis of the influence of education about ecosystem goods and services on natural capital valuation
- Analysis of natural capital valuation on judgments concerning quality of life

Evaluation of Quality of Life and Political Demand
In a democracy, political change is driven by demands made by citizens. Presumably, demands for improvements in sustainability policy are driven by citizens' dissatisfaction with their quality of life.

To understand better the relationship between quality of life judgments and political demand, the following research and education topics should be addressed:

- Analysis of factors influencing judgments about quality of life
- Analysis of thresholds of satisfaction relating to quality of life
- How quality-of-life judgments and satisfaction thresholds change over time and the contextual factors that induce these changes
- Influence of education on satisfaction thresholds and the relative importance of factors influencing quality of life judgments
- Analysis of the factors, including the relative importance of quality of life judgments, on political demand

Political Response to Political Demand and Information about Sustainability Progress

Of course, political demand for policy change is useless unless policy institutions respond in an appropriate way – with accurate scientific information and in conformance with citizens' expectations.

Recommended research and education topics in this domain include analyses of the ... :

- historical political responses to political demand
- current political demand for sustainability policy change
- influence of education on political demand
- influence of political demand on current willingness of policymakers to formulate sustainability policies
- influence of education on policymakers' willingness to formulate sustainability policies

Analysis of Policy Alternatives and Policy Learning

Since the goal of sustainability policy should be the effective and efficient accomplishment of sustainability outcomes, it is important to forecast accurately the outcomes of policy alternatives in order to select the alternative most likely to increase fair, balanced, and sustained prosperity.

Where accurate forecasts are not possible, it is equally important to build opportunities into policies that will quickly and efficiently yield valuable information that can inform subsequent policy revision – the cornerstone of adaptive management.

The following research and education needs in this domain are recommended:

- Development of decision support systems that can forecast policy outcomes
- Development of adaptive management provisions for incorporation into policies to maximize reduction of uncertainty
- Development of educational programs to inform policymakers and stakeholders about potential policy outcomes predicted from analysis of policy alternatives and measured from adaptive management programs

Evaluation of Program Implementation Alternatives

Policy implementation requires careful consideration of institutional arrangements. Even the best-formulated policies will not yield successful outcomes if the implementation is inadequate.

Research and education needs in this domain are:

- Legal analysis of statutes and regulations to identify conflicts, loopholes, and other legal impediments

- Administrative analysis of agency jurisdictions, missions, resources, expertise, procedures, and fragmentation that hamper effective implementation

- Political analysis of support coalitions, legislative committee structures, and other potential hurdles and opportunities for restructuring implementation agencies and programs

- Education of policymakers and stakeholders about the existing legal, administrative, and political obstacles to – and opportunities for – program reorganization

Prediction of Stakeholder Compliance Willingness with Sustainability Policies

Sustainability success relies not on only good policies and effective implementation but also a willingness of stakeholders to comply with sustainability provisions. Stakeholder resistance can defeat policy intentions. Therefore, the following research and education efforts are recommended, an anlysis of ... :

- factors influencing stakeholders' willingness to change behavior

- stakeholders' for behavioral change preferences

- education on stakeholders' willingness to change behavior

- policy alternatives' affect on stakeholders' willingness to change behavior

Prediction of Behavioral Change in Response to Policies and Information about Sustainability Progress

Of course, the willingness of stakeholders to comply with sustainability policies must be followed with effective behavioral change in order to achieve policy success.

Research and education needs in this domain include an analysis of ... :

- relationship between willingness to change behavior and actual behavior
- education on actual changes in behavior
- frequency, duration, and extent of behavioral change in response to policy change

This compilation is not exhaustive but nevertheless demonstrates the range and depth of research and education needed to move toward sustainability effectively and efficiently. This should be achieved through interdisciplinary collaborations with the goal of systems-level understanding. The old model of discipline-specific research and education alone will not suffice.

The obstacles to sustainability will require substantial effort to overcome. Therefore, collaborations among universities, government, and the private sector are essential.

Institutional, historical, and ideological barriers to cooperation must be removed and trust built as we move forward together toward our common goal of prosperity based on a fair, balanced, and sustainable improvement to our quality of life.