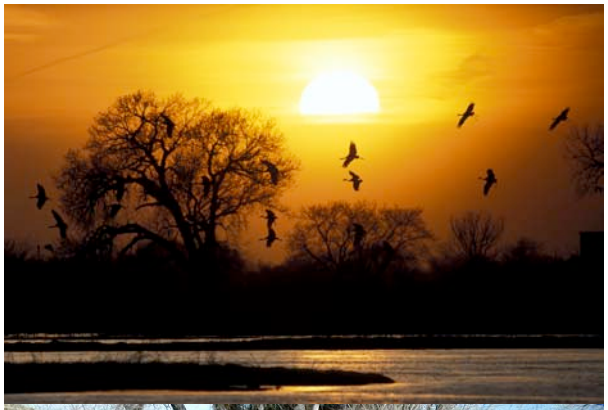

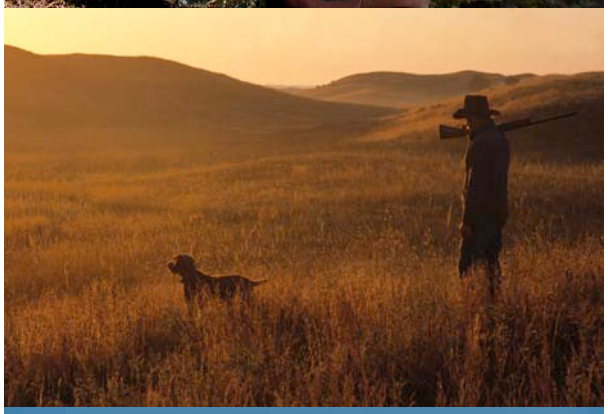

Natural-Resource Amenities and Nebraska's Economy:

Current Connections, Challenges, and Possibilities

Prepared by

ECONorthwest
99 W. Tenth, Suite 400
Eugene, OR 97401
(541) 687-0051
www.econw.com

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Photographs courtesy of the Nebraska Game and Parks Commission.

If you have questions or comments regarding this report, please contact:

Ernie Niemi
email: niemi@eugene.econw.com;
phone: 541-687-0051.

EXECUTIVE SUMMARY

Natural resources do not have to be converted into crops, electricity, or other commodities to support economic growth. Instead, growth can occur when natural resources provide recreational opportunities (bird-watching, fishing, boating, etc.) and other amenities consumers find desirable. This process is called amenity-driven growth.

This report examines the current status of, and potential for natural-resource-related, amenity-driven growth in Nebraska. Resource-related amenities may be able to stimulate economic growth in the state through four mechanisms:

1. **Improve the Quality of Life.** Nebraskans may be able to improve the economy by making the state more attractive, especially to highly productive people. Areas with abundant amenities tend to attract people—especially entrepreneurs and those with high levels of education—and to experience faster growth in jobs and income.
2. **Encourage Feedback to the Farm Sector.** Nebraskans may be able to improve the economy by capitalizing on natural-resource amenities in ways to bolster the farm sector. Amenity-driven growth may increase off-farm job opportunities for members of farm and ranch families. Some farms and ranches may increase earnings by using natural resources for agritourism activities. Practicing environmentally sound farm practices, such as irrigating with no more water than crops need, may increase many farms' net earnings.
3. **Expand Recreation and Other Commercial Uses of Natural Resources.** Nebraskans may be able to improve the economy by stimulating growth in the recreation industry. Americans spend a lot on resource-related recreation. National expenditures in 2001 on three activities, fishing, hunting, and wildlife-watching, averaged $81, $103, and $103, respectively per trip, and totaled $35.6, $20.6, and $38.4 billion for the year. Some recreational activities important in Nebraska, such as bird-watching, are growing rapidly.
4. **Protect Environmental Values.** Nebraskans may be able to improve the economy by reducing damage to the environment. Ecosystems provide many valuable goods and services. Some sustain species and special landscapes, others knit together the web of life, mitigate floods, control pests, … the list is perhaps endless. Impairing these goods and services can retard growth by causing communities to rely on more costly substitute services, and by triggering changes in economic behavior, either voluntarily or through regulation.

The economic forces underlying amenity-driven growth are powerful. Spatial differences in amenities, of all types, account for about half the interstate differences in job growth. Natural-resource amenities are especially important. Most studies, though, have focused on mountains, ocean beaches, and other amenities absent in Nebraska, raising the

possibility that it lacks what is needed to have any hope of using natural-resource amenities to generate jobs, incomes, and community stability.

Evidence indicates, however, that Nebraska has its own, distinctive style of amenities potentially capable of generating amenity-driven growth: rivers and reservoirs; agricultural as well as undeveloped landscapes; opportunities for fishing, hunting, and wildlife-watching; trails; state parks; and areas with aesthetically pleasing topography and scenery. Nearly all Nebraskans indicate that the state's natural resources are important to the quality of life they enjoy living in Nebraska.

These feelings notwithstanding, the four mechanisms of amenity-driven growth currently sometimes work to Nebraska's disadvantage.

Quality of Life. Nebraska has some serious economic challenges, some of which seem to stem from its inability to compete successfully with other states for productive households. Much of the state exhibits slow or even negative growth: between 2000 and 2004, for example, only one county (Sarpy) experienced population growth faster than the national average. Moreover, the state has demonstrated a tendency to lose highly-educated people. Between 1995 and 2000 it had a net loss of more than 4,500 young people with at least a bachelor's degree; between 1985 and 1999, it lost $246 million in personal income—about 1.1 percent of the state's total—because of the brain drain.

These challenges have many roots, among them limited public access to amenities, and perceptions that natural resources are degraded. About 97 percent of Nebraska is privately owned and typically managed for purposes other than providing the public with recreational and other amenities. News items about environmental degradation are abundant, among them: surface waters typically contain 10 – 14 herbicides or related chemical compounds; the width of the Platte River has been reduced 40 – 90 percent above Grand Island; manipulation of the Missouri River Basin has reduced populations of invertebrate species important to the food web by about 70 percent. To the extent that people perceive Nebraska's natural resources to be degraded and difficult to reach, these resources are likely to exert a negative, not positive, influence on household-location decisions.

Farm Sector. Agriculture is an economic powerhouse in Nebraska. Even so, some farmers and ranchers face challenges that amenity-driven growth might ease. Some landowners might earn additional revenues through agritourism: those who lease land for hunting, for example, earn $10 – $20 per acre. Others might reduce their costs: research in the Upper Big Blue Natural Resources District, for example, found that, with more efficient use of water and fertilizer, some farmers with 500 acres could realize annual savings of $23,600, reduce pollution, and leave water for other uses. And amenity-driven growth might generate new off-farm job opportunities for some who depend on income from off-farm sources to sustain not just their standard of living but their ability to remain on their farms and ranches.

Recreation Industry. Recreationists took almost 8 million trips to fish, hunt, and watch wildlife in Nebraska in 2001, and spent $46, $90, and $59 per trip, respectively. Nonetheless, the state's recreation industry is one of the smallest in the United States. In contrast to other western states, little land and water is open to public access. Also important is a prevailing attitude among landowners, which sees land and water primarily, if not exclusively, as economically important only when they are used as inputs to the production of commodities—crops, livestock, and electricity—or when they absorb pollutants. Some evidence indicates this attitude is changing. A growing number of farmers are expressing interest in agri-tourism, for example, as a way to augment farm earnings. Several communities are leading the way to capitalize on natural-resource amenities: attracting business and residential investment to the riverfront in Omaha, rafters to the Niobrara River in Valentine, and bird-watchers to the central Platte. Much potential remains untapped, however.

Environmental Values. Past actions have reduced the ecosystem's ability to provide valuable goods and services. Groundwater pollution threatens water supplies of the state's major cities, for example, the state has lost many of its wetlands, and more than 600 species face significant risk of extirpation in the state, with 80 of these among those most at risk of extinction globally or nationally. As the ecosystem's ability to provide goods and services declines, society must do without or develop more costly substitutes.

The value of lands used to produce recreational and other amenities compares favorably with, and sometimes exceeds, the value of lands used to produce crops and livestock. Areas providing high-quality recreational opportunities probably can support fishing, hunting, and wildlife-watching activities with an annual value greater than $120 per acre, whereas the annual rent in Nebraska for agricultural production is $97 per acre for cropland and $12 per acre for pasture. Overall willingness to pay for preserving areas capable of producing recreational and other amenities, including the protection of rare species, can be as high as $3,000 – 7,000 per acre. In contrast, the average price of agricultural land in Nebraska is $1,430 per acre for cropland and $310 per acre for pasture.

The economic output of activities linked to the amenities derived from the state's natural resources is smaller than the output linked to the commodities, but it is nonetheless significant. The 2002 agricultural census, for example, found that farms and ranches in Nebraska produced crops and livestock with a commercial net value, exclusive of government subsidies, of about $890 million. In comparison, a 2001 survey found that the resources supporting fishing, hunting, and wildlife-watching activities in the state had a net value of about $350 million.

Many Nebraskans have demonstrated a willingness to promote amenities, such as bird migrations, seeing their actions as a contribution to the quality of life not just for themselves but also for others. The information presented in this report indicates that greater contributions to the state's

economy are possible. They typically would originate from the interests of landowners, and be linked to private and public investments in access and ancillary facilities (roads, motels, etc.). Some efforts to capitalize on amenities might entail converting land and water resources from the production of commodities (corn, cattle, etc.) to the production of amenities (recreational opportunities, fish and wildlife habitat, etc.). Others would not: with appropriate marketing and ancillary investments a farmer or rancher might enjoy higher earnings by producing commodities and amenities rather than commodities alone.

Unless Nebraskans act more aggressively to capitalize on them, the economic forces underlying amenity-driven growth are likely to work to the state's disadvantage. Some amenities in other states can generate economic growth even when trampled, hard to reach, and overlooked, but Nebraska doesn't have this luxury. Amenities similar to Nebraska's are found elsewhere in the Great Plains, and, if Nebraska is to realize the full benefits of amenity-drive growth, it must distinguish itself from the crowd. To do so, Nebraskans must ensure their amenities have higher quality and better access, and they must have a clear vision of how to make the most of them. These are some of the areas with untapped potential for amenity-driven growth:

Omaha's riverfront	Missouri River trails	National wildlife refuges
Niobrara River-Valentine	Ponca State Park	Pine Ridge region
Middle Platte River	Wetlands	Lake McConaughy

The forces underlying amenity-driven growth affect the potential effectiveness of economic–development strategies that receive a lot of attention. A strategy to invest in education may have limited success unless the state becomes more attractive to highly-educated individuals and entrepreneurs. Relaxing environmental standards for some industries might increase the costs other industries and households incur to cope with environmental degradation and reinforce the perceptions that encourage some highly productive households to locate elsewhere. Intensifying the application of natural resources to agricultural production might boost that industry's output but slow overall economic growth unless the agricultural sector can reverse its declining ability to support farm families and avoid spillover costs that retard growth in other, faster-growing sectors.

None of this is intended to diminish in any way the economic importance of agriculture or other natural-resource industries, nor is it intended to disparage those who own and manage the state's land and water. Rather, the core message of this report is that the economic forces underlying amenity-driven growth exert a powerful influence on Nebraska's economy. The state possesses resources that could be used to take advantage of these forces, but so far Nebraskans have not fully seized these opportunities. This report makes no recommendations; it only provides background information for Nebraskans to consider as they make resource-management decisions in the future.

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I. INTRODUCTION

Nobody can reasonably doubt the economic importance of Nebraska's land and water resources. Nor can anyone reasonably doubt the economic importance of the industries and activities that for so long have dominated these resources. Agricultural activities on 53,000 farms and ranches occupy 46.4 million acres, or 94 percent, of the state's land.[1] To produce crops, farmers irrigate about 7.5 million acres with 1.2 million acre-feet of surface water and 5.8 million acre-feet of groundwater.[2] Ranchers divert about 160,000 acre-feet of water from the state's streams, and pump 122,000 acre-feet of groundwater each year.[3] The agricultural use of these land and water resources generates annual sales of crops and livestock totaling about $10 billion.

Efforts to wring jobs and incomes from the state's resources involve more than just farming. Businesses and households save money by relying on the state's waterways to carry downstream about 203,000 acre-feet of municipal sewage and industrial waste,[4] as well as pollutants from agricultural operations. More than 2,150 state-regulated dams store water and alter stream flows for miles downstream.[5] Some of these dams store water for irrigation, but much of the water also produces electricity with a retail value of about $1.5 billion.[6] About 16.8 million acre-feet pass through hydroelectric generators use each year; thermal power plants use 2.6 million acre-feet.[7] The operation of federal dams on the Missouri River support barging activities with a gross value of about $7 million per

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[1] Nebraska Agricultural Statistics Service. 2002. *2002 Nebraska Agricultural Statistics*. http://www.nass.usda.gov/ne/2002book/pag_001.pdf (accessed December 1, 2005).

[2] Nebraska Natural Resources Commission and U.S. Geological Survey. 1998. *Estimated Water Use in Nebraska: 1995*. April, pp. 23-29. http://www.dnr.state.ne.us/otherresources/waterreport95.html (accessed January 6, 2006). An acre-foot is about 326,000 gallons, or the amount of water that would cover one acre of land one foot deep.

[3] Nebraska Natural Resources Commission and U.S. Geological Survey. 1998. *Estimated Water Use in Nebraska: 1995*. April, pp. 30-32. http://www.dnr.state.ne.us/otherresources/waterreport95.html (accessed January 6, 2006).

[4] Nebraska Natural Resources Commission and U.S. Geological Survey. 1998. *Estimated Water Use in Nebraska: 1995*. April, p. 33. http://www.dnr.state.ne.us/otherresources/waterreport95.html (accessed January 6, 2006).

[5] Association of State Dam Safety Officials. "Nebraska Dam Safety Program." http://www.damsafety.org/layout/subsection.aspx?groupid=1&contentid=182 (accessed December 1, 2005).

[6] U.S, Department of Energy, Energy Information Administration. 2004. *State Electricity Profiles 2002*. February, pp. 122-126. http://www.eia.doe.gov/cneaf/electricity/st_profiles/e_profiles_sum.html (accessed January 6, 2006).

[7] Nebraska Natural Resources Commission and U.S. Geological Survey. 1998. *Estimated Water Use in Nebraska: 1995*. April, pp. 32-33. http://www.dnr.state.ne.us/otherresources/waterreport95.html (accessed January 6, 2006).

year, and provide benefits of about $242 million to Nebraska's municipal-industrial water users.[8]

These economic benefits come at a price, however. Nebraska has some serious economic challenges, and mounting evidence suggests they stem, at least in part, from current uses of the state's natural resources. Some of the most notable challenges are:

- ***Rural flight.*** More than 50 of the state's counties lost population in the 1990s. In the first years of this century, population in only one county (Sarpy) grew faster than the national average. As rural communities and economies shrink, so too does their ability to provide roads, schools, and other essential public services without supplemental support from urban firms and households.
- ***Brain drain***. More young college graduates are moving out of the state than moving in, weakening Nebraska's ability to build and sustain innovative, competitive firms that can generate new jobs and incomes in the future.
- ***Insecure farm earnings.*** Half of the principal operators of Nebraska's farms and ranches earn income from off-farm work, and 30 percent work more than 200 days per year at off-farm jobs.[9] There are no obvious opportunities that will enable all farm and ranch families to rely solely on agricultural income in the foreseeable future.
- ***Stagnant industries.*** The state's economy has a heavy concentration of industries, especially resource-related industries, exhibiting no more than a tepid ability to generate new jobs and incomes. Overall job growth in Nebraska frequently lags behind the national average.[10]
- ***Deficit production.*** Many of Nebraska's farms and ranches operate at a loss: their costs to produce crops or livestock exceed the prices they receive for these products. To offset these losses, farmers and ranchers received more than $7 billion in federal subsidies for producing some commodities over the past decade.[11] Areas heavily dependent on farm subsidies tend to have economies less robust than other areas. If adopted—many believe the question is when, not if—proposals to curtail subsidies to farm production might depress farm-related jobs and incomes even further.

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[8] National Research Council, Committee on Missouri River Ecosystem Science. 2002. *The Missouri River Ecosystem: Exploring the Prospects for Recovery*. Washington, D.C.: National Academy Press, pp. 92-94.

[9] U.S. Department of Agriculture, National Agricultural Statistics Service. 2004. *2002 Census of Agriculture: State Summary Highlights*. June. http://www.nass.usda.gov/census/census02/volume1/ne/index2.htm (accessed January 6, 2006).

[10] Wilkerson, C. 2005. "What Do Expected Changes in U.S. Job Structure Mean for States and Workers in the Tenth District?" *Economic Review: Federal Reserve Bank of Kansas City*: 59-93.

[11] Environmental Working Group. 2006. *EWG's Farm Subsidy Database*. http://www.ewg.org/farm/regionsummary.php?fips=31000 (accessed January 6, 2006).

As farm families, business leaders, and public officials grapple with these challenges, many have suggested Nebraskans could generate additional jobs, higher incomes, and more robust communities by diversifying uses of the state's resources. For the most part, these suggestions involve shifting some resources away from sole production of agricultural and other commodities in areas with low economic return toward uses that would protect and enhance the natural character of the environment. These suggestions have been fueled by the experiences of communities elsewhere, many of which have found that land and water can generate more jobs and income when they provide recreational opportunities, scenic vistas, and other amenities for consumers than when they produce only agricultural goods and other commodities.

Some researchers use the term, amenity-driven growth, to describe the ability of healthy, attractive natural resources to generate jobs and incomes. Much of the research on this process, however, focuses on amenities absent in Nebraska: snow-topped mountains, ocean beaches, and warm winter climates. This research raises these questions: What are the forces underlying amenity-driven growth and how do they affect Nebraska? Does Nebraska have the types of natural-resource amenities needed to generate jobs, incomes, and community stability?

This report addresses these and related questions. We prepared it with support from a coalition of individuals representing these state agencies, offices, and private entities: American Rivers; the Center for Rural Affairs; Nebraska Department of Economic Development (Division of Business Development and Division of Travel and Tourism); Nebraska Game and Parks Commission; the Office of U.S. Senator Ben Nelson; the Office of U.S. Representative Jeff Fortenberry; and the University of Nebraska–Lincoln Water Center.

We separate our presentation into five parts. In Section II, we explain a conceptual framework for understanding the process by which natural-resource amenities accessible to the public (or lack thereof) can have a positive (negative) effect on economic growth. In Section III, we describe the occurrence of natural-resource-related, amenity-driven growth in the U.S., as well as the underlying forces and trends that make it powerful. In Section IV, we assess the applicability of the amenity-driven-growth process in Nebraska. In Section V, we briefly describe some of the lessons learned as states and communities elsewhere have attempted to capitalize on the amenity-driven-growth process. In Section VI, we highlight some of the state's natural-resource amenities, their current economic linkages, and their economic potential.

We emphasize that our focus is descriptive, not prescriptive. By explaining the current and potential interactions between Nebraska's economy and amenity-driven growth we are not saying that Nebraskans should make this or that decision regarding the management of resources, either in general or in particular. This report aims only to provide information regarding the role of amenity-driven growth in the state.

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II. NATURAL-RESOURCE AMENITIES AND ECONOMIC GROWTH: A CONCEPTUAL FRAMEWORK

Decades ago, the relationship between Nebraska's natural resources and its economy was straightforward. The major demands were limited: farmers and ranchers wanted land and water for growing crops and livestock, utilities wanted water to generate hydropower, and farms, industries, and municipalities wanted potable-water supplies and a cheap way to dispose of their wastes.

Today, though, things are much more complex. More people and industries demand land and water. Cities spread to farmland and compete more extensively with irrigators for water. Households increasingly seek both goods, such as clean water, and services, such as recreational opportunities. Additional demands have materialized with the concerns of scientists and the public about the environment. Water supplies also have changed. Variation in climate recently brought on a deep drought, conditions many fear will occur more frequently in the future, than they have in the recent past. Dams and irrigation systems have altered the spatial and temporal distribution of water. Farming has replaced a native ecosystem of many species with one that has far fewer.

The relationship between Nebraska's natural resources and its economy has evolved into one where a complex web of demands compete for scarce resources whose quantity and quality vary in complicated ways over space and time. This evolving competition embodies the values that individuals, households, businesses, and communities place on the state's natural resources. Hence, to understand the contributions—current and potential—natural resources make to the state's economy, one must understand the essential characteristics of the competition for these resources. Toward that end, we observe that the competition for natural resources typically does not stem from demands for the resources, themselves, but from demands for the many goods and services derived from the resources. The next section provides more detail.

A. THE VALUE OF NEBRASKA'S NATURAL RESOURCES STEMS FROM THE GOODS AND SERVICES THEY PRODUCE

From an economics perspective, Nebraska's land and water resources are important not in and of themselves but because they both produce things that benefit people, impose costs on them, and compose the environment.

Describing the economically important products derived from the state's natural resources is not a straightforward task. One widely accepted approach combines economic with ecological concepts, as shown in Figure 1. Its central feature is the ecosystem's production of *ecosystem goods and services*, which are important to people and, hence, have economic value. Sometimes this value materializes in market prices, as sellers and buyers trade a good or service, or a product derived from it. The absence of a market price, however, does not mean that a good or service has no value. Instead, as we discuss below, a good or service can have value even though it is not traded in markets. The economic importance of a good or service may arise when it is extracted, as when farmers divert water from a river to irrigate a crop, or when it remains *in situ*, as when anglers fish on the water left in the river. The ecosystem produces goods and services through processes, known as ecosystem functions, that derive from the ecosystem's structure.

The left side of Figure 1 highlights the importance of human actions that influence the ecosystem's structure and functions and, hence, its production of goods and services. The right side shows that sometimes humans place values on the structure of the ecosystem, e.g., the character of the landscape, rather than on the goods and services it produces. To simplify things, however, we use the terms, goods and services, to represent all those resource-related things that have economic value.[12]

The list of resource-related goods and services is long and growing, as ecological scientists learn more about the inner workings of ecosystems and people find new ways to derive benefits from them. Table 1 offers a representative list. Some of the goods and services in Table 1 will be unfamiliar to those who see natural resources as having economic value only in terms of their most visible uses: irrigation, industrial processing, municipal uses, and recreation. Indeed, some of them would have been unrecognized by many economists just a few years ago. The economic importance of the full slate of goods and services is now widely recognized, however.[13]

The systems that manage Nebraska's resources were established when the levels of understanding of ecosystems and the economy were more limited than they are today and, hence, they often failed to recognize goods and services whose importance is just emerging. The first focus was on marketed goods and services and it took decades for this focus to widen enough to include nonmarketed goods and services. For example, management of surface water stems from the state's 1895 adoption of a

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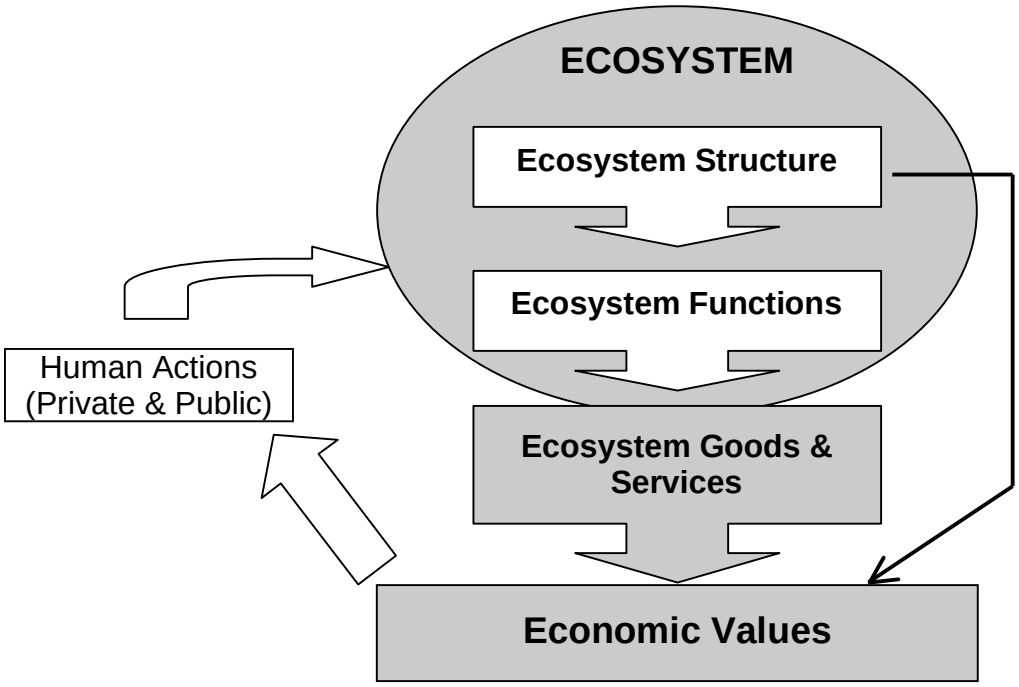
[12] We also use "goods and services" to include things, such as damaging floods, that are economically important in a negative rather than positive sense.

[13] *See*, for example, National Research Council, Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems. 2004. *Valuing Ecosystem Resources: Toward Better Environmental Decision-Making*. National Academies Press.

Figure 1. Connections between the Ecosystem and Economic Values



Source: ECONorthwest, adapted from National Research Council, Committee on Assessing and Valuing the Services of Aquatic and Related Terrestrial Ecosystems. 2004. *Valuing Ecosystem Services: Toward Better Environmental Decision-Making*. National Academies Press.

doctrine that appropriates water using the rule, first-in-time-first-in-right. The most senior claims on water are therefore associated primarily with the production of marketed crops and livestock. It was not until 1984 that the doctrine was expanded to include instream flows and then only for flows to maintain existing recreational uses or the needs of fish and wildlife species. Water uses associated with other goods and services, such as the formation of soil or the regulation of climate, have not been folded into the doctrine.

One should not, however, take the exclusion of a good or service from the resource-appropriation doctrine to mean that its importance is zero. Also, one should not conclude that those goods and services included in the doctrine are necessarily more valuable than those that are excluded. Instead, it is important to recognize that, given the current state of documentation and understanding, it is generally impossible to know with precision all the values of the different goods and services that can be derived from a given natural resource. To have the best possible understanding of these values one must look to all the relevant information—quantitative and qualitative, local and distant.

Table 1. Functions, Goods, and Services of Nebraska's Ecosystem

Functions		Examples of Goods and Services Produced
1	Production and regulation of water	Natural and human-built features capture precipitation; filter, retain, and store water; regulate levels and timing of runoff and stream flows; influence drainage; and provide water for diverse human uses.
2	Formation & retention of soil	Wetlands and biota accumulate organic matter, and prevent erosion to help maintain productivity of soils.
3	Regulation of atmosphere & climate	Biota produce oxygen, and help maintain good air quality and a favorable climate for human habitation, health, and cultivation.
4	Regulation of disturbances	Wetlands and reservoirs reduce economic flood damage by storing flood waters, reducing flood height, and slowing velocity of flood.
5	Regulation of nutrients and pollution	Wetlands and riparian vegetation improve water quality by trapping pollutants before they reach streams and aquifers; natural processes improve water quality by removing pollutants from streams.
6	Provision of habitat	Prairies, wetlands, riparian vegetation, streams, and reservoirs provide habitat for economically important fish and wildlife.
7	Food production	Biota convert solar energy into plants and animals edible by humans.
8	Production of raw materials	Streams and biota generate materials for construction, manufacturing, fuel, and fodder; streams possess energy convertible to electricity.
9	Pollination	Insects facilitate pollination of economically important wild plants and agricultural crops.
10	Biological control	Birds, bats, fish, and microorganisms control pests and diseases.
11	Production of genetic & medicinal resources	Genetic material in wild plants and animals provide potential basis for drugs and pharmaceuticals.
12	Production of ornamental resources	Products from plants and animals provide materials for handicraft, jewelry, worship, decoration, and souvenirs
13	Production of aesthetic resources	Landscapes, wetlands, streams, and reservoirs provide basis for enjoyment of scenery from roads, housing, parks, trails, etc.
14	Production of recreational resources	Streams, reservoirs, fish, birds, mammals, and other wildlife provide basis for outdoor sports, eco-tourism, etc.
15	Production of spiritual, historic, cultural, and artistic resources	Landscapes, streams, and reservoirs serve as basis for spiritual renewal, focus of folklore, symbols of group identity, motif for advertising, etc.
16	Production of scientific and educational resources	Land and water provide inputs for research and focus for on-site education.

Source: Adapted by ECONorthwest from De Groot, R., M. Wilson, and R. Boumans. 2002. "A Typology for the Classification, Description and Valuation of Ecosystem Functions, Goods and Services." *Ecological Economics* 41: 393-408; Kusler, J. 2003. *Assessing Functions and Values.* Institute for Wetland Science and Public Policy and the Association of Wetland Managers, Inc.; and Postel, S. and S. Carpenter. 1997. "Freshwater Ecosystem Services." in *Nature's Services: Societal Dependence on Natural Ecosystems*. Edited by G.C. Daily. Washington, D.C.: Island Press, pgs. 195-214.

B. Competing Demands Shape the Benefits and Costs Nebraska Derives from Its Natural Resources

In most times and places, Nebraska contains insufficient land and water to satisfy all the demands for all the goods and services shown in Table 1. Hence, when these resources produce one set of goods and services, the demands for others go unmet. In other words, there is competition for the state's natural resources. Because this competition both reflects and shapes the economic values of the different goods and services derived from these resources, an understanding of the essential characteristics of this competition can provide useful insights into the values that exist today and how they change over time.

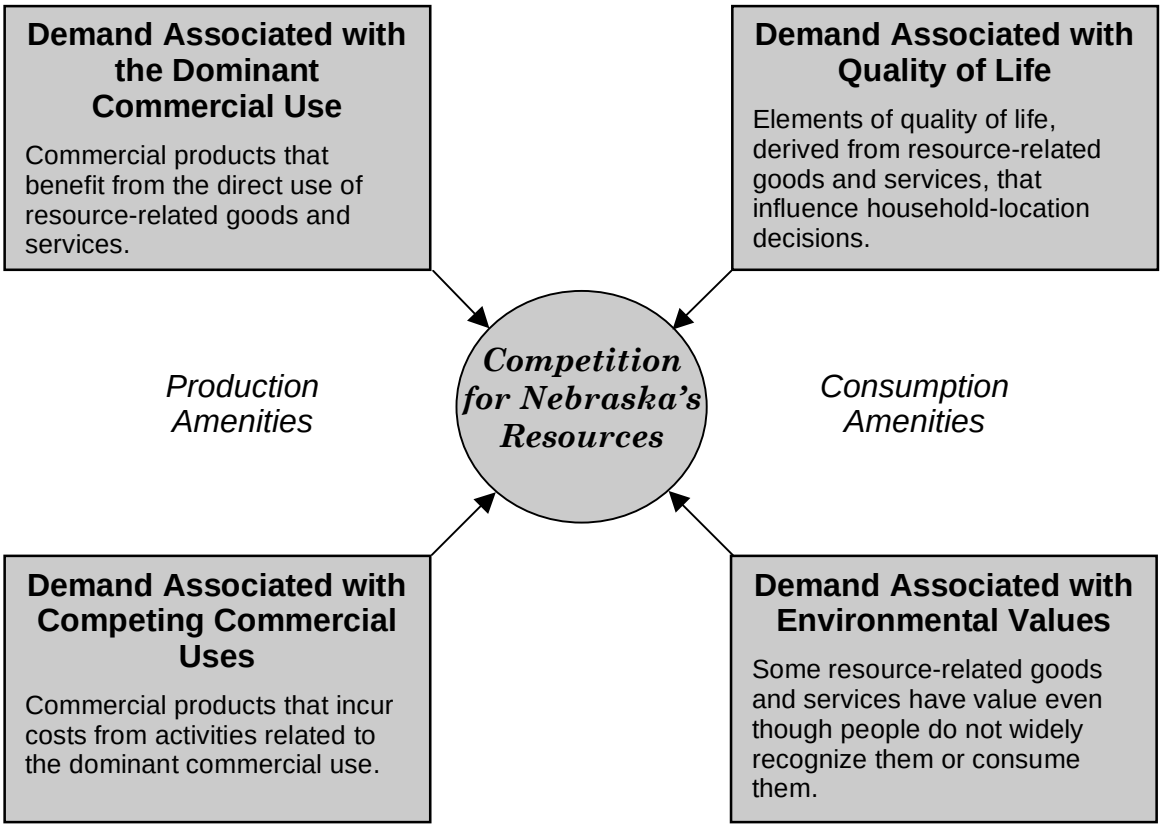
One could categorize the competition in any of a number of ways, but we employ a taxonomy that distinguishes among the four types of demand illustrated in Figure 2. Two of these, which we call demands for production amenities, include demands for those goods and services that are, or could be, inputs to a process that produces other goods and services. The other two, which we call demands for consumption amenities, include demands for goods and services that directly enhance the well-being of consumers.

To facilitate the discussion, we assume that one type of demand, which we call the dominant commercial demand, prevails and then look at the consequences for the others. Moreover, we initially describe the consequences by portraying the competitors in the classic posture, with insular and adversarial interests, so that when one successfully secures the use of a natural resource, others are left wanting. From this perspective, Nebraskans face stark either-or choices: they can use natural resources to produce either the goods and services associated with agriculture, hydropower, and other commodities or the goods and services associated with clean water, recreational opportunities, and other amenities, but not both.

In some circumstances, such tradeoffs dominate. In others, however, they do not. Hence, later in our discussion we recognize that the competing demands often overlap, with individuals, families, businesses, and communities wanting more than just one good or service from natural resources. Farm families, for example, typically want to use their land and water to produce both crops (or livestock) and a healthy, pleasant environment. Many urban residents want both clean water in streams and irrigation water to support a healthy agriculture industry. In this context, some landowners and water managers may be able to use these resources to produce multiple outputs, some of which are linked to commodity-driven growth and others to amenity-driven growth.

Against this backdrop, we now describe the different types of competing demands for natural resources.

Figure 2. The Competing Demands for Nebraska's Natural Resources



COMPETITION FOR PRODUCTION AMENITIES

On the left side of Figure 2 we place the competing demands for production amenities, i.e., elements of Nebraska's ecosystem that facilitate commercial production. Farming, ranching, sand and gravel mining, and urban development are the most important of these demands. Demand for the state's production amenities comes from private and public enterprises, which we define broadly, to include farming, ranching, private corporations, incorporated cities, and public agencies, as well as some households, such as those that develop new housing.

Dominant Commercial Uses. We separate the demands for production amenities into two groups. One of these, shown in the upper left of Figure 2, directly use land and/or water; and they have dominant resource-use characteristics. This type of demand usually is associated with a familiar industry, such as farming or ranching, or with common urban-development activities. In general, only one product benefits from a particular use of a resource, but sometimes there may be more. A dam

and reservoir may benefit anglers, irrigators, and consumers of hydroelectricity, for example.

Competing Commercial Uses. Sometimes, the dominant commercial use of resource-related goods and services imposes costs on other enterprises, which are represented in the bottom left of Figure 2. When irrigators deplete stream flows or reservoirs and reduce fish habitat, for example, they may reduce the production of irrigators downstream who now have less water for their fields, or impose costs on fishing guides who now have fewer prime fishing spots for their customers.

We purposefully separate the demands on the left side of Figure 2 into two boxes to drive home the message that there may be competition, within the commercial sectors, for Nebraska's land and water resources. We do so because often people perceive that the competition for natural resources occurs only between a single commercial interest and environmental-protection interests. By highlighting the existence of competition within the commercial sectors, we emphasize the point that the positive consequences arising from one set of commercial activities frequently have offsetting, negative effects on others.

COMPETITION DIRECTLY FROM CONSUMERS

On the left side of Figure 2, Nebraska's natural resources are economically important because they are inputs in the production of other things, such as beef and hydroelectricity, that consumers want to have. On the right side, consumers' connection to these resources is more direct. That is, the resources are economically important for how they directly contribute to consumers' well-being. In economics parlance, such contributions are called consumption amenities. There are two types of demand for Nebraska's resource-related consumption amenities: one affects residential location decisions; the other does not.

Consumption Amenities and Residential Location. Some resource-related goods and services, such as recreational opportunities and scenic vistas, contribute directly to the well-being of people who have access to them. Their contribution to consumers' well-being makes them economically important in their own right, but they are more important when they also influence the location decisions of households and businesses. We show the demands for consumption amenities that influence location decisions in the upper right portion of Figure 2.

Economists' explanation of why some consumption amenities can influence location revolves around the concept of *consumer's surplus*. Whenever a consumer derives benefits (increases in well-being) from a good or service that exceed the costs he or she pays to obtain it, the net benefit represents a net increase in well-being. This increment is called consumer's surplus.

In general, the nearer that people live to resource-related amenities, the better their access, and the lower their cost of taking advantage of them. Thus, consumers can increase their consumer's surplus—their economic well-being—by living near locations that offer recreational opportunities, pleasant scenery, wildlife viewing, and other amenities. This consumer's surplus is, in effect, a *second paycheck* residents receive from living in a place where they have easy access to these amenities. Thus, the total welfare of residents near them is the sum of this second paycheck plus the purchasing power of the money income they receive from their first paycheck. Spatial differences in the size of the second paycheck affect behavior by influencing households to locate in one place rather than in another.

Quality-of-life values can be powerful. As we describe below, many Nebraskans say the primary reason they live in the state is to enjoy its quality of life. Some undoubtedly could enjoy higher earnings (their first paycheck) living elsewhere, but choose not to do so because their total welfare (the sum of the first and second paychecks) is higher here. Some aspects of this quality of life—the strength of its communities, schools, and churches, for example—are not directly related to natural resources. But others are: the open space, outdoor way of life, and opportunities for fishing and hunting, to mention a few. All else equal, if the state's resource-related consumption amenities improve, some people already in Nebraska will have a greater tendency to stay and additional people will tend to move in. Degradation of the amenities will have the reverse impacts.

Because quality-of-life values do not materialize in easily recognizable forms they are often overlooked. Studies that measure the output, jobs, incomes, and taxes generated when resources are used to produce crops and other commodities, for example, generally are blind to the output, jobs, incomes, and taxes that could have been generated, had the resources been used to produce quality-of-life amenities that attract households. By their nature, such studies focus on the value of marketed goods and services (crops, livestock, etc.) and on the first paychecks commodity-oriented industries pay workers. Calculating the economic importance of quality-of-life amenities, in contrast, requires a different approach using different data and different analytical techniques. First, they must examine the value of the nonmarketed goods and services (scenic views, fish habitat, etc.) that constitute the amenities. That is, they must determine the size of the second paycheck enjoyed by nearby residents. Second, they must determine the extent to which the amenities influence household-location decisions. Third, they must examine the extent to which the influence on households stimulates commercial output, jobs, incomes, and the like.

Environmental Values. The lower right portion of Figure 2 represents demands associated with economic values that do not necessarily entail a conscious, explicit use of Nebraska's natural resources. We call these

environmental values. There are two general categories: nonuse values and values of goods and services that generally go unrecognized.

Nonuse values arise whenever individuals want to maintain some element of the environment, even though they do not directly or personally use it and have no intention to do so.[14] Sometimes this value is linked to the existence of a species, a scenic landscape, or other resource. It also can be associated with maintaining a particular cultural or ecological characteristic of a resource. Nonuse values also arise when people place a value on ensuring that a particular resource will be available for future generations. For example, a person might be willing to pay some amount to ensure that their grandchildren will have the same opportunities they've had to enjoy a free-flowing river, to see an open prairie or a traditional ranching landscape, or to go fishing. Similarly, some may desire that soils and water resources be used in a sustainable manner, so future generations will have opportunities to farm or ranch and pass along a legacy comparable to what exists today.

Ecosystems can provide goods and services that people consume without being aware of them. Some of these are part of the so-called web of life: operating at local, regional, and global scales, they help sustain human and other life in Nebraska and elsewhere. Others have a more direct link to the well-being of the state's residents, as when the microorganisms of an out-of-sight aquifer help purify water before it reaches the intake of a municipality's water utility. Even though people might not consciously consider the benefits of these services on a day-to-day basis, they probably would do so if they had a better understanding of them or if the services were to become threatened or noticeably diminished. Many people today, for example, consciously consider the economic values associated with the services produced by the global climate, in ways that were unknown, except to scientists, just a few years ago. Some scientists and economists believe many more services have great economic value although this value and, hence, the demands for the services are not visible.[15]

Unlike the other types of demand in Figure 2, demands related to environmental values do not necessarily affect population growth, jobs, income, or other indicators of economic activity in Nebraska. Residents of Omaha and Seattle, for example, might place a value on and, hence, express a demand for protecting the existence of the pallid sturgeon, a fish at significant risk of extinction in Nebraska's rivers, but this demand might never result in any discernible change in economic activity. Then again, some changes might occur. Those wanting to ensure the sturgeon's existence might trigger protective actions by donating money, pressing for the expenditure of public funds, or lobbying for regulations toward that end. The resulting investments in fish habitat would generate jobs and

[14] These values are also known as passive-use values or intrinsic values.

[15] *See*, for example, Daily, G.C. 1997. *Nature's Services: Societal Dependence on Natural Ecosystems*. Washington, D.C.: Island Press.

incomes, and the resulting improvements in habitat might, in turn, be seen as quality-of-life amenities that influence household locations and generate further economic activity.

Similarly, dormant demands for environmental goods and services might manifest themselves as people become aware of their importance or of a threat to them. The Conservation Reserve Program and other federal programs that pay farmers to protect and enhance environmental resources on their properties, for example, came into place as the American public realized the importance of these resources, and the payments help farmers and generate jobs and incomes in rural communities.

C. MECHANISMS OF AMENITY-DRIVEN GROWTH

The preceding paragraphs form the basis for identifying four mechanisms by which recreational opportunities, scenic areas, and similar natural-resource amenities in Nebraska can contribute to growth in jobs, income, and economic well-being. They are:

Mechanism 1 – Quality of Life. Resource-related, consumption amenities can influence the location decisions of households and, hence, alter growth in population, investment, jobs, incomes, and other variables. This mechanism is represented in the *upper right* corner of Figure 2. Even when an amenity is not powerful enough to influence a household's location decision, it can still produce economic benefits—a second paycheck—for the household.

As we discuss below, considerable evidence suggests that, in an era when workers, managers, investment capital, and jobs are highly mobile, the economic strength of a community or state often is determined by its ability to attract and hold productive people. All else equal, a community or state with a larger supply of skilled workers also will attract more firms to employ them. One with more innovative entrepreneurs will generate more new enterprises. And one with a larger number of households with high disposable incomes will attract more investment in businesses to sell them goods and services.

Mechanism 2 – Feedback to the Farm Sector and Other Dominant Commercial Uses. Recreational, aesthetic, and other natural-resource amenities also can, under some circumstances, produce economic benefits for the dominant commercial activities represented in the *upper left* of Figure 1, even those that, at first glance are incompatible. Protection and enhancement of natural-resource amenities may strengthen jobs and incomes in agriculture and other dominant industries, insofar as these actions lower operating costs, create new consumer products, diversify on-farm enterprises, or otherwise

increase the availability of complementary sources of income. Research we discuss below indicates, for example, that some farms and ranches can earn additional revenues through agritourism. Other research suggests some farmers can raise their profits as well as the profits of downstream farmers by reducing erosive practices that send productive soils into streams. in the future.

Mechanism 3 – Other Commercial Uses. Sometimes commercial interests are able to convert resource-related amenities directly into jobs and incomes, through activities represented in the *lower left* of Figure 2. These are often oriented toward outdoor recreation: motels, hunting/fishing guides, canoe/tube/raft outfitters, retailers selling recreational equipment, and so forth. Also common are businesses, such as restaurants located on a river bank or souvenir shops selling items with a resource-oriented motif, that generate sales, jobs, and incomes through their association with attractive natural resources. Other firms focus on building homes and commercial centers in attractive settings, monitoring and maintaining water quality in swimming areas, providing security in public parks, repairing boats.

Mechanism 4 – Environmental Values. Amenities associated with nonuse and dormant demands, represented in the *lower right* of Figure 2 can have an indirect, but nonetheless sometimes powerful, impact on economic activity in a community or state. If the number of species at risk of extinction is mounting, this information may dampen investment in an area by signaling that problems generated by past industrial activities are likely to impose restrictions and costs on future activities. Conversely, a community in which the natural ecosystem is able to provide extensive flood-control services will pose lower risks for investors, not just from lower risks of flood damage but also from lower risks of high taxes to support artificial flood-control programs.

Under ideal circumstances, households, businesses, communities, states, and the federal government would engage these four mechanisms to ensure that natural resources generate the optimal contributions to the well-being of our society. In the real world, though, the contributions from natural resources to the economy are almost certainly less than optimal and imperfectly recognized. Particularly important are the missed opportunities to improve well-being by increasing the production of amenities. The forces that bring about this outcome are several and powerful. By their nature, resource-related amenities typically can be enjoyed concurrently by many, and those who incur the costs of producing them often are not the ones who directly enjoy their benefits. In such settings, the producers have incentives to produce too few amenities and consumers have incentives to overcrowd or otherwise degrade them. A landowner has no direct incentive to manage his/her land to provide a scenic vista for the neighbors, for example, but, if he/she does, each neighbor might build a higher house to get a better view, diminishing the view for others.

Our laws and habits often reinforce suboptimal outcomes by encouraging the degradation of natural-resource amenities, or at least looking the other way when this occurs. Encouragement comes from the many subsidies to extractive or development uses of natural resources. With the subsidies, the scale of these activities—agricultural, mining, suburbanization, and many more—is greater than it would be without them. Even without subsidies, the scale of many, perhaps all, resource-using activities is greater than the optimal levels because those who engage in the activities are allowed to pass to others some of the costs of their actions. Economists use the term, externalities, to describe such transfers of costs from one group to another. Environmental externalities occur when one use of a resource degrades the resource, creating costs for others. Farming, industrial, and municipal pollution released into a stream or an aquifer, for example, imposes costs on those who would use the water downstream. Actions that deplete groundwater or the habitat of a rare species imposes costs on those members of future generations who will want to enjoy these resources.

Because of these powerful, pervasive forces, Nebraskans (and the residents of other states) have an economic-development glass that is both half empty and half full. Half empty because they almost certainly have fewer jobs and lower incomes than they would if they had managed their natural resources with greater emphasis on the four mechanisms of amenity-driven growth. Half full because they almost certainly have opportunities to employ these mechanisms to greater benefit in the future.

We address below some of the opportunities open to Nebraskans for using these four mechanisms to stimulate amenity-driven growth. First, though, we discuss in greater detail some of the evidence regarding the role of amenity-driven growth in the American economy.

III. NATURAL-RESOURCE AMENITIES AND ECONOMIC GROWTH: OVERVIEW

In December, 2003, more than 100 economists issued a letter with a consensus statement regarding the economic importance of western states' natural environment, which is summarized by these sentences:

> The West's natural environment is, arguably, its greatest, long-run economic strength. The natural landscapes of the western states, with wide open spaces, outdoor recreational opportunities, and productive natural-resource systems underlie a quality of life that contributes to robust economic growth by attracting productive families, firms, and investments. … Resource-management policies and economic-development activities that significantly compromise the environment will likely do more economic harm than good.[16]

This statement reflects extensive theoretical and empirical research documenting—throughout the U.S.—the economic importance of natural-resource amenities. In this section we highlight this research to provide a context for subsequently examining the economic importance of natural-resource amenities in Nebraska. To structure the presentation, we extend our discussion, from the preceding section, of the competing demands for natural resources and four mechanisms by which natural-resource amenities can contribute to economic growth. We begin with the process wherein amenities can influence the location decisions of households and, hence, alter growth in population, jobs, incomes, and other variables. This mechanism is represented in the upper right corner of Figure 2.

A. NATURAL-RESOURCE AMENITIES, QUALITY OF LIFE, AND ECONOMIC GROWTH

The economists who issued the statement regarding the economic importance of the West's natural environment framed their discussion of natural-resource amenities by observing that the relationship between the environment and the economy has changed markedly:

> In the distant past, the West's natural resources were widely abundant and important to the economy primarily when they were converted into something else. We converted forests, mineral deposits, and streams into lumber, metals, and hydroelectricity; valleys, wetlands, and hillsides into agricultural and urban landscapes; and land, water and air into waste repositories.
>
> Today, conditions have changed.

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[16] Whitelaw, E. (editor). 2003. *A Letter from Economists to President Bush and the Governors of Eleven Western States Regarding the Economic Importance of the West's Natural Environment*. December 3. http://www.salmonandeconomy.org/pdf/120303letter.pdf (accessed December 8, 2005).

These changes, which are not unique to the West, have many dimensions. Increases in the population and in households' incomes, plus changes in tastes and preferences, have dramatically increased demands for outdoor recreation, scenic vistas, clean water, and other resource-related consumption amenities. The supply of many amenities—measured in terms of quantity, quality, or both—has not kept pace, however. Indeed, many natural-resource amenities have been degraded by industrial exploitation, urban development, pollution, and over-use. With demand outstripping supply, the economic value of many amenities is growing rapidly.

The increasing value of natural-resource amenities interacts with the increased mobility of workers, households, and firms, reshaping the economic-growth process for communities and states. In the past, economies grew largely by a process in which business investment, often in a resource-extraction or manufacturing industry, created job opportunities that attracted workers and their families. Economists call this growth process *jobs-first-people-follow*. In it, the availability of jobs is the primary determinant of a household's decision about where to locate.

Over the past several decades, though, another process of economic growth has emerged. Called *people-first-jobs-follow*, it materializes when workers and their families opt to locate in a community even though they have no immediate job prospects, instead basing their location decisions largely on the quality of life the community offers. Businesses, often in service and retail industries, recognize the growing pool of workers and consumers and make investments that create jobs.

People enjoy a higher quality of life by living in one community rather than in others because they have access to amenities important to them at a lower cost than they would incur if they lived elsewhere.[17] These cost savings are equivalent to a *second paycheck* that complements the income households receive, in a *first paycheck* from employment, investment, and transfer payments. All else equal, households living in a community where they enjoy a larger second paycheck have a higher standard of living than they would have living in a community where their second paycheck would be smaller.

How important are amenities and the second paycheck in today's economy? More significant for this discussion, How important are the natural-resource amenities? What are the consequences for communities that dedicate natural resources to industries that produce first paychecks but diminish the second paycheck? There are no precise answers to these questions, but a general sense of the economic power of amenities as a whole, and of natural-resource amenities in particular, is provided by

[17] Natural-resource amenities are not the only ones that can influence household-location decisions and, hence, economic growth. Also important are the quality of schools, level of crime, proximity to a major sports arena, community support for the fine arts, … even the number of nearby espresso bars.

studies that have looked at their correlation with growth in population, jobs, and income. Other insights come from studies that have estimated the value people place on specific amenities.

Amenities and Trends in Population, Jobs, and Income

The overall economic power of amenities, of all types, is indicated by a recent analysis in which researchers looked at differences in job growth among the 50 states to distinguish between the two growth processes: jobs-first vs. people-first.[18] They concluded that the two have roughly the same impact on job growth. This finding indicates, at a minimum, that amenities and their influence on household-location decisions may be a major determinant of economic growth, and perhaps the primary determinant in some parts of the country. Furthermore, it signals that communities and states should seriously consider the role of amenity-driven growth when they initiate efforts to promote economic prosperity.

Amenities and Local Economic Growth. Some of the resource-related amenities associated have the greatest power to drive economic growth through their influence on the quality of life.[19] Communities close to large, undeveloped areas, such as designated wilderness areas and national parks, have experienced faster population growth than those lacking these amenities. In the Great Plains, counties recognized as having scenic amenities tend to have more robust populations than those that don't.[20] More robust growth in jobs and income generally occurs in areas having resource-related amenities, such as outdoor recreational opportunities and high environmental quality, whereas areas with higher emissions of hazardous materials experience slower growth.[21]

One illustrative study, for example, examined rates of growth in jobs and incomes in the early 1990s in three sets of counties: (1) extensively scenic counties in the Great Plains and along the Rocky Mountain front range; (2) moderately scenic counties; and (3) other rural counties.[22] They found that the average annual growth in jobs was 3 percent, 1.7 percent, and 1.4

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[18] Partridge, M. and D. Rickman. 2003. "The Waxing and Waning of Regional Economies: The Chicken-Egg Question of Jobs Versus People." *Journal of Urban Economics* 53: 76-97.

[19] For a more thorough discussion of relevant research, *see,* for example, Power, T.M. and R.N. Barrett. 2001. *Post-Cowboy Economics: Pay and Prosperity in the New American West*. Island Press, and Kim, K.-K., D.W. Marcouiller, and S.C. Deller. 2005. "Natural Amenities and Rural Development: Understanding Spatial and Distributional Attributes." *Growth and Change* 36 (2): 273-297.

[20] Drabenstott, M. and T.R. Smith. 1996. *The Changing Economy of the Rural Heartland*. Federal Reserve Bank of Kansas City. April.

[21] Templet, P.H. 1993. "The Emissions-to-Jobs Ratio." *Environmental Science & Technology* 27: 810-812.

[22] Henderson, J. and K. McDaniel. 1998. "Do Scenic Amenities Foster Economic Growth in Rural Areas?" *Regional Economic Digest, Federal Reserve Bank of Kansas City* First Quarter: 11-16.

percent, respectively. The corresponding rates for growth in per capita incomes were 1.2 percent, 0.4 percent, and 0.1 percent. The authors concluded these differences arose largely because more scenic counties attracted more retired persons and experienced faster growth in the tourism industry.

Much research on amenity-driven growth involves an index of natural-resource amenities developed at the USDA's Economic Research Service.[23] It aggregates six amenities: warm winter temperatures, winter sunshine, temperate summer temperatures, low summer humidity, topographic variation, and water resources (area of water bodies as percent of total area). The two maps in Figure 3 illustrate the county-level correlation between the amenity index and growth in population between 1970 and 1996. Population grew only 1 percent in counties with the lowest amenity index, but 120 percent for those with the highest, for example. The researchers also found that the influence of the different amenities varies from place to place. Topography attracts people to counties in the Rocky Mountain states, for example, but water resources exert a greater influence in the Great Plains.

Open Space and Housing. Natural-resource amenities also can influence household-location decisions at spatial scales smaller than counties. Many studies have found, for example, that open space can increase the demand for and, hence, the prices of nearby land and houses.[24] Here are some illustrative examples:

- Open space within 400 meters increases the value of residences in Berks County, Pennsylvania; conversion to commercial, industrial, or residential use would lower house prices.[25]
- Property values for homes within 1,500 feet of an urban park in Portland, Oregon, are $1,671 (in 2002 dollars) greater than the values of similar but more distant properties.[26]
- A national survey found 50 percent of respondents said they were willing to pay 10 percent more for a house near a park or protected

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[23] McGranahan, D.A. 1999. *Natural Amenities Drive Rural Population Change*. U.S. Department of Agriculture, Economic Research Service, Food and Rural Economics Division. Agricultural Economic Report No. 781. September.

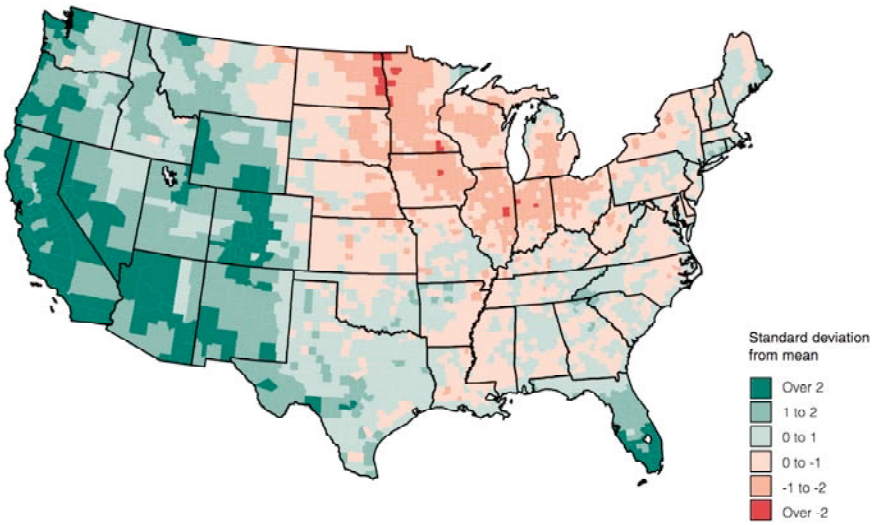
[24] *See,* for example, the literature review in Fausold, C. and R. Lilieholm. 1996. *The Economic Value of Open Space*. Research Paper WP96CF1. Lincoln Institute of Land Policy. http://www.californiaopenspace.com/the_economic_value_of_open_space.htm (accessed December 10, 2005).

[25] Ready, R. and C. Abdalla. 2003. *The Impact of Open Spaces and Potential Local Disamenities on Residential Property Values in Berks County, Pennsylvania*. Department of Agricultural Economics and Rural Sociology, the Pennsylvania State University. Staff Paper 364. June. http://landuse.aers.psu.edu/study/BerksLandUseLong.pdf (accessed January 6, 2006).

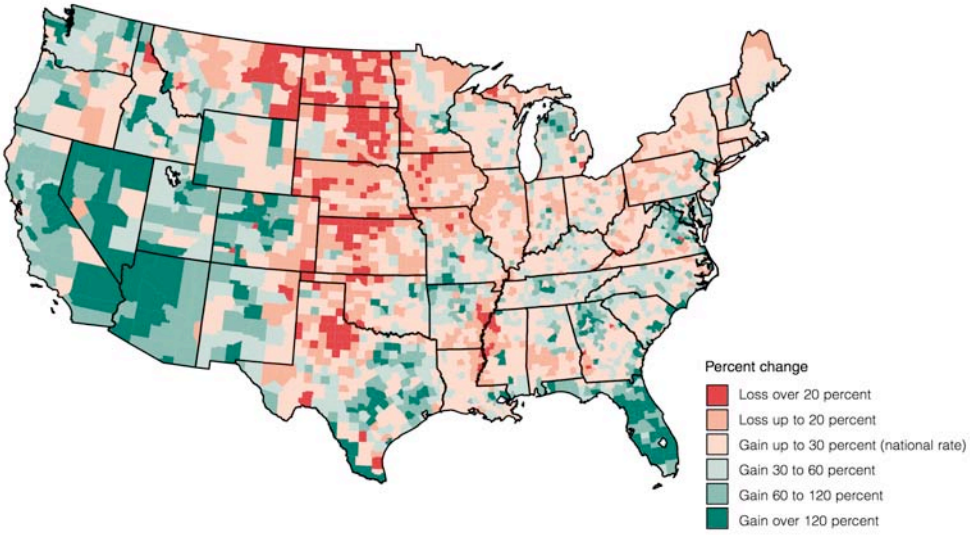
[26] Lutzenhiser, M. and N.R. Netusil. 2001. "The Effect of Open Spaces on a Home's Sale Price." *Contemporary Economic Policy* 19 (3): 291-298.

Figure 3. Natural-Resource Amenities and Population Growth

Amenity scale by county, 1970-96



Population change by county, 1970-96



Source: McGranahan, D.A. 1999. *Natural Amenities Drive Rural Population Change.* U.S. Department of Agriculture, Economic Research Service, Food and Rural Economics Division. Agricultural Economic Report No. 781. September.

open space, and 57 percent said they would choose a home close to parks and open space over one that was not.[27]

[27] Research by the National Association of Realtors and the National Association of Homebuilders, cited in Nebraska Game and Parks Commission. 2005. *State Comprehensive Outdoor Recreation Plan (SCORP): Assessment and Policy Plan 2006-2010 Draft,* pp. 34-35.

- Property values increase with proximity to some urban wetlands in Minnesota.[28]
- All else equal, a property fronting on reservoirs in the Tennessee River Valley has greater value than a property that does not.[29]
- River views increased residential property values in Saskatchewan.[30]
- Conversion of one acre of developable pasture land in Maryland to conservation land increases the average value of neighborhood residential properties by $3,307.[31]

Conversely, some research documents the negative impact some natural-resource amenities have on housing demand. One recent study, for example, concluded that the housing market places a negative value on proximity to wetlands in a rural area of coastal North Carolina, where wetlands and open space are by no means scarce.[32]

Many communities, recognizing the importance of open space, have incorporated parks, greenbelts, biking and hiking trails, and other open spaces into their neighborhoods. These actions can have a greater impact on household-location decisions when they occur early enough so that development can occur around them rather than by shoehorning them into areas already developed. Sometimes, open spaces can have far-reaching impacts on urban development, as when households choose homes in suburban or exurban locations so that their commutes can offer views of a greenbelt, park, or river. A survey of homeowners in Omaha, Nebraska, for example, reached conclusions similar to those of studies elsewhere: owners of homes near a recreational trail believe the proximity increases the value of homes and positively influenced their home-buying decision.[33]

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[28] Doss, C.R. and S.J. Taff. 1996. "The Influence of Wetland Type and Wetland Proximity on Residential Property Values." *Journal of Agricultural and Resource Economics*. 21(1): 120-129. *See* also, Lupi Jr., F., T. Graham-Tomasi, and S.J. Taff. 1991. "A Hedonic Approach to Urban Wetland Valuation." Staff Paper P91-8. Department of Agricultural and Applied Economics, University of Minnesota, St. Paul MN.

[29] Knetsch, J. 1964. "The Influence of Reservoir Projects on Land Values." *Journal of Farm Economics*. 46: 520-538.

[30] Kulshreshtha, S.N. and J.A. Gillies. 1993. "Economic Evaluation of Aesthetic Amenities: A Case Study of River View." *Water Resources Bulletin* 29: 257-266.

[31] Irwin, E.G. 2002. "The Effects of Open Space on Residential Property Values." *Land Economics* 78 (3): 698-704.

[32] Bin, O. and S. Polasky. 2004. *Evidence on the Amenity Value of Wetlands in a Rural Setting*. Department of Economics, East Carolina University. November 22. http://www.ecu.edu/econ/wp/04/wetlands_ecuwp.pdf (accessed December 14, 2005).

[33] Greer, D.L. 2000. *Omaha Recreational Trails: Their Effect on Property Values and Public Safety*. University of Nebraska at Omaha, Recreation and Leisure Studies Program. June. http://www.unomaha.edu/recadmin/trails/omahatrails.pdf (accessed April 20, 2006). A 1992 study found that users of trails elsewhere spent $4 – $11 per person per day. *See* research cited in Rivers, Trails and

Recent research indicates the impact of some natural-resource amenities extends far beyond the fringe of urban and suburban areas. Researchers looked at the relationship between the proximity of "nice places" on the economies of the 90 largest metropolitan areas in the U.S.[34] For the purposes of their study, "nice places" include national parks, lakeshores, seashores, and recreation areas. Their results demonstrate that households in the metropolitan areas enjoy a second paycheck from proximity to one or more of these "nice areas." As an indication of the power of the second paycheck associated with "nice places" the authors conclude the analysis suggests "that individuals would be willing to take a 4.0 percent pay cut in order to have the closest 'nice place' one hundred miles closer."

Amenities, Incomes, and Education. There are exceptions, of course, but, in general, the demand for amenities increases with income. This relationship is illustrated by a recent analysis of groups who moved into (in-migrants), moved out of (out-migrants), or stayed in (nonmigrants) rural counties of the Mountain West states during the 1994-97 period.[35] The researchers compared the average incomes of these three groups in counties with the highest concentration of recreational and scenic amenities against their counterparts in four other categories of counties, whose economies are characterized by concentrations of government, mining and manufacturing, farming, or sectoral diversification. The amenity-rich counties had the highest rate of net immigration. Moreover, the average per capita income of in-migrants to these counties was at least 39 percent higher than the average income of in-migrants to the other categories of counties. It was also 60 percent higher than the average income of in-migrants to counties with the highest concentration of farming activity. Overall, immigration to the amenity-rich counties increased total incomes in these counties 11 – 23 times the immigration-related increases in incomes in the other types of counties.

The linkage between natural-resource amenities and the location decisions of persons with higher incomes suggests there also is a linkage with higher education. Persons with a bachelor's degree, for example, earn 75 percent more than persons with only a high school diploma, and persons with a professional degree earn almost four times more.[36]

Conservation Assistance Program, National Park Service. 1995. *Economic Impacts of Protecting Rivers, Trails, and Greenway Corridors.* Fourth edition.

[34] Schmidt, L. and P.N. Courant. Forthcoming. "Sometimes Close Is Good Enough: The Value of Nearby Environmental Amenities." *Journal of Regional Science.*

[35] Shumway, J.M. and S.M. Otterson. 2001. "Spatial Patterns of Migration and Income Change in the Mountain West: The Dominance of Service-Based, Amenity-Rich Counties." *Professional Geographer* 53 (4): 492-502.

[36] Estimates are for earnings of workers 25 to 64 years old and the period, 1997-99. Day, J.C. and E.C. Newburger. 2002. *The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings.* U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. July.

Attracting persons with high education levels can have far-reaching impacts on economic growth. A study of rural counties in southern states, for example, found that counties where the proportion of adults attending college in 1980 was 5 percentage points higher experienced faster growth in incomes and jobs over the next two decades.[37] On average, their per capita incomes grew 2.5 percent faster per year, and jobs grew 5.5 percent faster.

In many parts of the Great Plains, the number of highly educated persons is diminishing, and although the factors underlying the phenomenon are many and complex, some researchers have concluded that natural-resource amenities play a role.[38] This so-called *brain drain* occurs from many rural areas of the U.S. to metropolitan areas, and from some regions, especially the Great Plains, to others. Its economic implications can be startling. The authors of one study examined the disparity between earnings of rural and urban workers, and the significance for rural economic growth.[39] They determined that workers in nonmetropolitan areas earned 20 percent less, on average, than their counterparts in metropolitan areas in 1980, but 31 percent less by 1998. They then offered this assessment of the outlook for rural communities:

> Except where there are colleges and universities or amenities attractive to professional workers (attractive scenery, good weather, recreational or cultural opportunities, good schools) rural areas do not have a large enough professional-level workforce to attract or develop 'new economy' industries. As information technology develops, it may overcome the disadvantages of … rural areas. Still rural areas must offer natural amenities, good schools, access to transportation networks, and other infrastructure to attract high-wage professionals who work in 'new economy' industries. An educated, trainable workforce is also important to attract service and high-tech jobs. Without these jobs, the earnings gap between urban and rural America is likely to continue widening.

Others have similarly concluded that, if the brain drain continues unabated, residents of the nation's rural areas face weak economic prospects. Some, though, have recognized that communities may be able to improve their prospects by correcting factors that make them unattractive to highly educated and highly skilled individuals:

> Brain drain is an important economic development concern. Higher levels of human capital are associated with higher levels of income, increased productivity, and economic growth. Although the majority of rural counties have

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[37] Reported in Gibbs, R. 2005. "Education as a Rural Development Strategy." *Amber Waves* 3 (5): 20-25. http://www.ers.usda.gov/AmberWaves/November05/pdf/FeatureEducationNovember2005.pdf (accessed December 5, 2005).

[38] Some research indicates that, for many rural areas, the brain drain is accompanied by a higher than average in-migration of persons with lower than average levels of education. *See*, for example, Nelson, P.B. 2004. *Nonearnings Income Migration in the United States: Anticipating the Geographical Impacts of Baby Boom Retirement.* Center for Retirement Research at Boston College. December. http://www.bc.edu/crr/papers/wp_2004-31.pdf (accessed December 6, 2005).

[39] Gale, F. and D. McGranahan. 2001. "Nonmetro Areas Fall Behind in the 'New Economy'." *Rural America* 16 (1): 44-52.

> fallen behind in attracting and retaining college-educated workers, other rural counties have not. This suggests that brain drain is not an inherent problem for rural counties, but something that might be overcome with properly designed, well-informed policies.[40]

The evidence we discuss above indicates that communities seeking to develop "properly designed, well-informed policies" to stem the brain drain should identify and, if feasible, pursue opportunities for providing attractive natural-resource amenities.

This conclusion is further supported by studies that found natural-resource amenities influence the location decisions of people with strong entrepreneurial capabilities. This relationship can be especially important to economic growth insofar as, all else equal, the greater a community's population of entrepreneurs, the greater the likelihood it will experience the development of new businesses, jobs, and incomes. Two studies, published by the Federal Reserve Bank of Kansas City, described the relationship in these terms:

> The self-employed are especially free to locate where they please due to the small scale of their firms. Many will locate in areas with attractive topography, abundant water area, and comfortable weather. In the 1990s, the growth of entrepreneurs was stronger in rural areas that enjoyed high levels of natural amenities [and] there appears to be a strong relationship between rugged landscapes, scenic beauty, and [entrepreneurial performance].[41]

> Given the industry mix of entrepreneurs, it is not surprising to find stronger entrepreneur growth in rural communities with service-based economies and natural amenity areas that attract vacationers and retirees. … The most scenic rural areas, which often serve as recreation and retirement destinations, enjoyed growth [in rural nonfarm self-employment] of almost 4 percent, while the least scenic rural counties grew barely half that.[42]

Summary. Extensive evidence documents the influence natural-resource amenities exert over households' location decisions. Not every household has the same degree of attraction to each amenity, and amenities are not the only factor that influences location decisions. On average, though, households tend to be attracted to areas with aesthetic natural scenery; a climate that is warm, sunny, and not too humid; interesting topography; large open spaces; and a healthy natural environment. People particularly sensitive to natural-resource amenities tend to have higher levels of income, education, and entrepreneurial capabilities. When an area attracts people with these characteristics, the resulting economic growth can occur in diverse sectors of the economy, not just sectors directly related to the resources themselves. Entrepreneurs attracted to an area, for example, may develop new businesses in almost any industry.

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[40] Artz, G. 2003. "Rural Area Brain Drain: Is It a Reality?" *Choices* 4th Quarter: 11-15.

[41] Low, S., J. Henderson, and S. Weiler. 2005. "Gauging a Region's Entrepreneurial Potential." *Economic Review* 90 (3): 61-89. http://www.kc.frb.org/publicat/econrev/PDF/3q05low.pdf (accessed December 2, 2005).

[42] Henderson, J. 2002. "Building the Rural Economy with High Growth Entrepreneurs"." *Economic Review* 87 (3): 45-70. http://www.kc.frb.org/Publicat/econrev/Pdf/3q02hend.pdf (accessed December 2, 2005).

Having documented the influence natural-resource amenities exert on household-location decisions, and its economic significance, we now turn our attention to the potential strength of this influence.

Economic Value of Natural-Resource Amenities

The economic value people place on a natural-resource amenity strongly indicates its potential power over their location decisions. All else equal, the greater the value a household places on a given amenity, the greater the likelihood that it will decide to locate nearby.

Particularly important is one component of value, which economists call *consumer's surplus*. It is the difference between what people are willing to pay and what they actually pay to enjoy an amenity. Consumer's surplus represents an increase in net economic well-being: if people are willing to pay $100 to go fishing but pay only $20 to do so, then their economic well-being increases by $80. Consumer's surplus is directly linked to the *second paycheck*, which represents the influence amenities exert over household-location decision. Whenever a household enjoys a consumer's surplus from living near an outdoor recreation site or other natural resource, it is a measure of the second paycheck.[43]

Economists have conducted many studies to estimate the consumer's surplus associated with recreational activities in different parts of the country. Table 2 summarizes the findings of studies conducted between 1967 and 2003 for outdoor recreation activities on public lands in the Intermountain Region, which includes Nebraska. The data in the table show, for example, that the several studies that have looked at camping activities indicate the average consumer's surplus is $34.72 per person per day, measured in 2004 dollars.

The numbers in Table 2 shed some light on the relative influence that different types of outdoor recreation opportunities can exert on household-location decisions. A recreational activity that can attract more people probably will generate greater consumer's surplus. All else equal, a household with four members would, on average, enjoy a consumer's surplus of (4 x $34.72 =) $138.88 per day camping, four times that of a single person. Also, some types of recreational opportunities can exert more influence on household-location decisions than others. All else equal, an area offering mountain biking opportunities, with an average consumer's surplus of $184.48, would exert more than six times the leverage of one offering only opportunities for picnicking ($28.27). The data in Table 2 also indicate that, if the residents of a community were to

[43] Sometimes households must share the second paycheck. For example, if many households seek to enjoy the benefits of living near a particular amenity, they bid up the price of housing so that some or most of the second paycheck is captured by landlords.

Table 2. Estimates of Average Consumer's Surplus per Participant per Day, by Activity, for Recreational Activities on Public Lands in the Intermountain Region:[a] Summary of Studies from 1967 to 2003

Recreational Activity	Mean of Estimates[b]	Recreational Activity	Mean of Estimates[b]
Mountain biking	$184.48	Downhill skiing	$39.62
Pleasure driving	$69.74	Hiking	$38.53
Floating/rafting/canoeing	$67.70	Wildlife viewing	$37.24
Waterskiing	$56.96	Snowmobiling	$36.29
Other recreation	$56.35	Camping	$34.72
Motorboating	$53.68	Cross-country skiing	$29.88
Rock climbing	$50.45	Swimming	$29.54
Fishing	$49.57	Picnicking	$28.27
Hunting	$48.55	Sightseeing	$23.58
General recreation	$48.46	Off-road vehicle driving	$22.81
		Activities in wilderness	$41.68

Source: Loomis, J. 2005. *Updated Outdoor Recreation Use Values on National Forests and Other Public Lands*. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Gen. Tech. Rep. PNW-GTR-658. http://www.fs.fed.us/pnw/pubs/pnw_gtr658.pdf (accessed December 10, 2005).

[a] The Intermountain Region includes Arizona, Colorado, Idaho, Kansas, Montana, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Utah, and Wyoming.

[b] Values expressed in 2004 dollars.

create average camping opportunities, they would produce consumer's surplus of $34.72 per day per camper. If, however, they somehow can imbue those opportunities with the characteristics of wilderness, the average consumer's surplus would increase to ($34.72 + $41.68 =) $76.40 per day per camper, more than doubling their leverage over household-location decisions, all else equal.[44]

Several studies illustrate the use of estimates of consumer's surplus, such as those in Table 2. One of these looked at the recreation-related consumer's surplus generated by lands covered by the Conservation Reserve Program (CRP), which compensates farmers to manage highly erodible and other lands for environmental protection.[45] Shortly after the CRP began, the authors found that, in the Northern Plains states,

[44] We offer these comparisons only to indicate the general influence of different attributes on consumer's surplus. We caution readers that, before making more adventuresome interpretations of the numbers in Table 2, they should secure expert guidance regarding the underlying assumptions and data.

[45] Feather, P., D. Hellerstein, and A.J. Hansen. 1999. *Economic Valuation of Environmental Benefits and the Targeting of Conservation Programs*. U.S. Department of Agriculture, Economic Research Service. AER-778. April.

the CRP was generating consumer's surplus associated with freshwater recreation ($0.32 per acre per year), pheasant hunting ($3.41), and wildlife-watching ($3.42).[46]

Text Box 1 illustrates another effort to describe the net economic benefit recreationists derive from natural-resource amenities. The focus is a 1998 study that described consumer's surplus derived from hunting, fishing, and wildlife-watching at the Necedah National Wildlife Refuge in Wisconsin. Drawing on the results of studies they believed relevant, the researchers estimated the lower and upper bound of the average consumer's surplus for each type of activity. They then multiplied these numbers times the number of trips to determine the total consumer's surplus, and divided the results by the number of acres to estimate the average consumer's surplus per acre, for each activity. They found that, although the average consumer's surplus per trip was lowest for wildlife-watching, the number of participants in this activity was so much greater that, overall, this type of activity generated by far the greatest consumer's surplus per acre.

The numbers in Table 2 and the findings of studies that employ them (or their analogs for other resources and regions) demonstrate how the value people place on natural-resource amenities can become an engine of economic growth. People who engage in the activities listed in Table 2 (or in similar activities) get something for nothing: participation in these activities is more valuable to them than what they pay to do so. If that consumer's surplus—which we also call the resource-related portion of the second paycheck—is large enough, then at least some people will choose to live nearby. When they do, the economy is likely to grow in diverse, unforeseeable ways, for these people are likely to have all sorts of skills, interests, and assets.[47] This diversity, in some situations, is capable of yielding robust economic growth in communities adjacent to the resource amenities. It also can affect those larger urban centers that are farther away but still close enough for its residents to enjoy a boost in consumer's surplus from their proximity to the amenities.

One must be cautious, however, in using the numbers in Table 2, or those reported in given study. The connections between resource amenities and the economic growth that accompanies the people attracted to them are difficult to quantify. The findings of past studies provide useful insights into the consumer's surplus associated with a given type of natural-resource amenity, but the consumer's surplus associated with a specific amenity may be larger or smaller.

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[46] All values are measured in 2005 dollars.

[47] *See*, for example, Shumway, J.M. and S.M. Otterson. 2001. "Spatial Patterns of Migration and Income Change in the Mountain West: The Dominance of Service-Based, Amenity-Rich Counties." *Professional Geographer* 53 (4): 492-502.

Text Box 1
Economic Consequences of Expanding the Necedah National Wildlife Refuge, Part I: Consumer's Surplus

In 1998 the U.S. Fish and Wildlife Service examined the potential economic consequences of expanding the Necedah National Wildlife Refuge, in central Wisconsin, by acquiring 18,100 acres along the Yellow River.[a] The objective would be to protect and enhance breeding habitat for migratory birds, waterfowl, and other wildlife, and to maintain an important corridor for birds, butterflies, and other migratory species. The area is nearly level, with sandy soils, a sinuous stream with many oxbows, small ponds, and a predominant plant community of riparian (streamside) forest.

The study developed these estimates of the consumer's surplus, by type of recreational activity and per acre, at the refuge:

Estimated Consumer's Surplus per Trip, by Type of Recreational Activity

	Consumer's Surplus per Trip (1996)	
	Lower Bound	**Upper Bound**
Hunting		
Big game	$35	$45
Small game	$21	$55
Waterfowl	$14	$47
Migratory birds	$14	$47
Fishing*	$17	$107
Wildlife Viewing	$21	$31

* The lower bound represents the consumer's surplus associated with fishing for bullheads, the upper bound represents the consumer's surplus associated with fishing for pike.

Estimated Consumer's Surplus per Acre, by Type of Recreational Activity

	Consumer's Surplus per Acre (1996)	
	Lower Bound	**Upper Bound**
Hunting	$6.21	$10.08
Fishing	$2.86	$17.11
Wildlife Viewing	$51.40	$75.87
Total*	$60.50	$103.10

* Totals may differ from the sum of the components due to rounding.

[a] Malloy, S.J., R.E. Unsworth, and E.A. Blomdahl. 1998. *Economic Assessment for the Necedah National Wildlife Refuge Comprehensive Conservation Plan*. U.S. Department of Interior, Fish and Wildlife Service. March. http://www.indecon.com/NWR%20Economic%20Analyses/Necedah_NWR.pdf (accessed December 10, 2005). Value measured in 1996 dollars.

The findings of recent research on recreational activities at Iowa's Clear Lake is instructive regarding the importance of environmental quality to recreational activities in the Great Plains.[48] A 2001 survey of visitors found that, on average, each household group spent $51 in the nearby community per visit, with in-state residents paying $48 and out-of-state residents paying $93 per trip. Average spending per day was $26 for single-day trips, and $98 for multi-day trips. When asked questions about the importance of the lake's water quality, respondents indicated that, on average, they would be willing to pay $425 to improve the lake's water quality to a specified level. They also indicated that, if water quality were improved to a high level, they would visit perhaps as much as 50 percent more frequently. They were even more sensitive to potential decreases in water quality, indicating that, if it decreased they would cut their visits by more than two-thirds.

Water quality can have big impacts, insofar as 57 – 67 percent of Iowa's households visited at least one lake in Iowa during 2001-2002; on average, each household visited the state's lakes 8 times during the period.[49] The respondents also perceived that water quality can have impacts extending beyond their recreation activities. About half of the respondents said the lake nearest them was very or somewhat important in determining the economic vitality of their community, making the community an interesting or vibrant place in which to live, and attracting and retaining young people. About one-third said the nearest lake was very or somewhat important in helping employers attract and retain a skilled workforce and influencing the decisions of businesses to locate or expand locally. On average, each household takes fewer than one trip to lakes outside the state each year.

Survey respondents also indicated a broader demand for more resource-related amenities. About 60 – 75 percent of the respondents indicated support for restoring woodlands, wetlands, and prairies, and for increasing the supply of park lands and natural conservation areas. This broader demand for amenities was seconded in a related survey that examined Iowans' usage of wetlands throughout the state.[50] Respondents indicated that the total value (expenditures plus consumer's surplus) of their recreational use of the state's wetlands was, on average, between

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[48] Azevedo, C.D., J.A. Herriges, and C.L. Kling. 2001. *Valuing Preservation and Improvements of Water Quality in Clear Lake.* Iowa State University Center for Agricultural and Rural Development. March. http://www.econ.iastate.edu/research/webpapers/paper_1949.pdf (accessed August 8, 2005).

[49] Azevedo, C.D., K.J. Egan, J.A. Herriges, and C.L. Kling. 2003. *The Iowa Lakes Valuation Project: Summary and Findings from Year One.* Iowa State University Department of Economics and Center for Agricultural and Rural Development. August 27. http://www.card.iastate.edu/environment/items/IowaLakesReport.pdf (accessed August 8, 2005). Between 27 percent and 35 percent of respondents indicated they had visited the Missouri or Mississippi Rivers, averaging fewer than two trips per year.

[50] Azevedo, C.D., J.A. Herriges, and C.L. Kling. 2000. *Iowa Wetlands: Perceptions and Values.* Iowa State University Center for Agricultural and Rural Development. Staff Report 00-SR-91. March. http://www.card.iastate.edu/publications/DBS/PDFFiles/00sr91.pdf (accessed August 8, 2005).

$137 and $202 per trip. Non-recreational services provided by wetlands, such as groundwater recharge, would have additional value. On more than half their visits, respondents reported they engaged in wildlife-viewing activities. Other popular activities (in declining order) were biking, hiking, and fishing. Visitors engaged in hunting only infrequently.

The quality-of-life mechanism represented in the upper right of Figure 2 is not the only way in which a natural-resource amenity can contribute to economic growth. We now address another, which arises not when people save money when they live near natural-resource amenities but when they spend money on resource-related activities.

B. The Recreation Industry and Other Commercial Uses of Natural-Resource Amenities

Many commercial activities that do not have a dominant position in the economy can generate jobs, incomes, and wealth from natural-resource amenities. In the lower left of Figure 2 we call these "Other Commercial Uses" to distinguish them from the dominant commercial use. We focus on one of these, the recreation industry, because it has received the most attention from economists. There are others that might be important in a particular place: restoration of degraded ecosystems and management of Superfund sites; resource-related research and education; and resource-related arts and crafts, for example.

Recreationists' expenditures on recreational activities associated with natural-resource amenities generate jobs and incomes. Some of these effects occur near their homes—as recreationists purchase equipment, for example—some occur while recreationists are en route from their homes to the recreational site, and some occur at the site.

A 2001 national survey by the U.S. Fish and Wildlife Service and other agencies estimated recreationists' average expenditures on freshwater fishing, hunting, and wildlife-watching activities. Total expenditures, by type of activity were about $35.6 billion, $20.6 billion, and $38.4 billion, respectively. Tables 3A and 3B translate these numbers into expenditures per day and per person for each activity. On average, Americans spent about $51 per day of fishing, $91 per day of hunting, and $103 per day watching wildlife. Every participant age 16 years and older spent about $805 on fishing, $1,592 on hunting, and $1,761 on watching wildlife during 2001.

Table 3A. Expenditures per Day of Recreational Activity, U.S. Average, 2001

Expenditure Category	Fishing[a]	Hunting	Wildlife-Watching[b]
Trip	$21.22	$23.25	$22.04
Equipment	23.93	45.61	63.17
Other	5.71	21.93	18.01
Total	$50.86	$90.79	$103.22

Table 3B. Annual Expenditures per Participant Age 16 Years and Older, U.S. Average, 2001

Fishing[a]	Hunting	Wildlife-Watching[b]
$804.64	$1,592.31	$1,761.15

Source: ECONorthwest, with data from U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. 2002. *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. October. http://www.census.gov/prod/2002pubs/FHW01.pdf (accessed December 12, 2005).

[a] Data are reported for trips and equipment for freshwater fishing, other than the Great Lakes. "Other" expenditures are estimated as 11.24 percent of total expenditures, the same percentage reported for all U.S. fishing expenditures.

[b] Data represent total trip, equipment, and other expenditures divided by number of days of nonresidential wildlife-watching activities, i.e., activities that entail travel from home. Assumes all equipment and other expenditures apply to non-residential activities even though they also may apply to residential activities.

Surveys conducted by the U.S. Fish and Wildlife Service and other agencies indicate that the percentage of Americans participating in fishing activities generally grew between 1955 and 1985, as did their fishing-related expenditures. The percentage participating in hunting activities declined over the same period, but their expenditures increased, though at a slow pace. The numbers of anglers, hunters, and nonresidential (away from home) wildlife-watchers declined nationally during the 1991-2001 period. In the Upper Great Plains states, the number of anglers remained fairly constant over the decade, and 27 percent of the population reported fishing in 2001. The number of hunters also remained constant, and 12 percent reported hunting in 2001. The data indicate the number of nonresidential wildlife-watchers declined sharply between 1991 and 1996, then remained constant. About 14 percent of the population participated in wildlife-watching activities away from home in 2001.

A related analysis illustrates that recreationists' expenditures have economic impacts beyond the expenditures themselves. The study estimated the total economic impacts of recreational visitors to national

wildlife refuges in the contiguous 48 states.[51] The researchers found that, on average, every 1,000 visits resulted in sales of $37,300, 0.65 jobs, and $12,400 in worker's earnings. Comparable data for expenditures on other recreational activities are less readily available. It is clear, though, that such expenditures for many activities are large and growing.

These numbers include the so-called multiplier effect within the national economy. It arises when recreationists' expenditures trigger additional expenditures so that the overall impact on the economy is larger that the initial, direct impact. The spatial distribution of the jobs and incomes, and the income per job will vary, depending on the type of location of the expenditure. Expenditures on specialized equipment, for example, may generate jobs and incomes some distance away, where the equipment is manufactured. Expenditures on local services, such as guides, will tend to generate jobs and incomes near the recreational site.

The multiplier, i.e., the total jobs (or income) stemming from a recreationist's expenditure divided by the direct jobs (or income) probably is between 1.0 and 2.5 for most recreation-related expenditures.[52] For a given expenditure, the multiplier within the town where it occurs is always smaller than the multiplier within the surrounding state or region, and the state or regional multiplier is smaller than the national multiplier.

One should exercise caution when using multipliers to estimate the jobs and incomes associated with changes in recreational expenditures. A multiplier gives a snapshot of how recreationists' expenditures ripple through an economy. A snapshot, however, is not the same as a moving picture, and any multiplier can give a misleading depiction of how a dynamic economy would respond over time to a *change* in expenditures. Many households have a more or less fixed amount to spend on recreation each year. If they increase their expenditures on one recreational activity in one location, they generally decrease their expenditures on other activities or at other locations by a comparable amount. Hence, any increase in jobs and income from the increased expenditures on the one activity will be offset by decreases elsewhere. In many instances, the offsetting effects can reduce the overall response to near zero.

Text Box 2 extends our earlier discussion of the economic consequences of expanding the Necedah National Wildlife Refuge. It shows an estimate of the total incomes, including the multiplier effect, that would be generated

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[51] Caudill, J. and E. Henderson. 2005. *Banking on Nature 2004: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation.* Division of Economics, U.S. Fish and Wildlife Service. September.

[52] A multiplier of 1.0 means there is no multiplier effect: there are no jobs (or income) generated within the economic of concern beyond those directly linked to a recreationist's expenditures. A multiplier of 2.5 means that every direct job generates an additional 1.5 jobs, so the total number of jobs is 2.5 times the number of direct jobs.

Text Box 2
Economic Consequences of Expanding the Necedah National Wildlife Refuge, Part II: Impacts on Income

In 1998 the U.S. Fish and Wildlife Service examined the potential economic consequences of expanding the Necedah National Wildlife Refuge, in central Wisconsin, by acquiring 18,100 acres along the Yellow River.[a] The objective would be to protect and enhance breeding habitat for migratory birds, waterfowl, and other wildlife, and to maintain an important corridor for birds, birds, butterflies, and other migratory species. The area is nearly level, with sandy soils, a sinuous stream with many oxbows, small ponds, and a predominant plant community of riparian (streamside) forest.

The study developed these estimates of the incomes that would be generated by recreational activity at added lands.

Estimated Total Local Income Generated, per Acre, by Type of Recreational Activity (1996 dollars)

	1996
Hunting	$16.72
Fishing	$17.13
Wildlife Viewing	$47.06
Total	$80.91

[a] Malloy, S.J., R.E. Unsworth, and E.A. Blomdahl. 1998. *Economic Assessment for the Necedah National Wildlife Refuge Comprehensive Conservation Plan*. U.S. Department of Interior, Fish and Wildlife Service. March. http://www.indecon.com/NWR%20Economic%20Analyses/Necedah_NWR.pdf (accessed December 10, 2005).

in the local economy, per acre, by expanding the refuge. We offer this illustration only to show one example where economists have estimated the recreation-related income that could be generated by changing the management of lands and water to take advantage of their amenity values. These numbers should be used cautiously, for they are specific to this refuge and analogous calculations elsewhere might yield smaller or larger numbers. Moreover, the researchers who conducted the analysis used an analytical tool that relies on a snapshot of the multiplier rather than one that sees the economy's dynamic ability to adjust to changes. Expanding the refuge might cause visitors to recreate here only as they diminish recreation at other local sites, so the actual total impact would be smaller than the researchers' estimates. Alternatively, the expansion might make the refuge as a whole so much more attractive that the total impact would be larger.

In the long run, a change in the recreational opportunities available can conceivably have an even larger effect, by altering the character of a local economy. Such an outcome might materialize because different recreation activities tend to attract enthusiasts with different age, income, and educational characteristics. A 1994-95 survey of Americans confirmed this

point by describing the characteristics of participants in 62 different outdoor recreational activities.[53] It found, for example, that 62 percent of kayaking enthusiasts nationwide had completed college, the highest percentage among the 62 different activities. College graduates also constituted more than half of the enthusiasts participating in sailboarding/windsurfing, sailing, and cross-country skiing. In contrast, big-game hunting had the lowest percentage of college graduates, 17 percent. Other activities for which less than 20 percent of the enthusiasts had college graduates were warmwater fishing, and snowmobiling. These numbers indicate that, if a community manages its natural resources to increase the supply of some recreational opportunities rather than others, it might influence the make-up of its workforce and households. All else equal, an economic-development strategy that aims to attract more college-educated workers, retirees, and investors may be more successful if it were to emphasize the availability of the recreational activities that this group tends to find most attractive.[54]

These offsetting effects, plus other concerns, cause some to raise questions about the ability of the resource-related recreation industry to generate economic growth in rural areas, especially those most remote from population centers.[55] Particular concern arises when tourism-related businesses generate low-wage jobs: "There is a perception that substituting traditional jobs in resource-extractive industries and manufacturing with more service-oriented jobs yields inferior earning power, benefits, and advancement potential [as well as] higher levels of unemployment, lower income levels, and generally lower overall economic well-being.[56] Moreover, long-term residents of an area can experience a deterioration of their quality of life as recreationists and immigrants congest the natural resources that attracted them to the area in the first place, push upward the costs of living, and/or have social values that

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[53] Cordell, H.K., B.L. McDonald, J.A. Briggs, R.J. Teasley, R. Biesterfeldt, J. Bergstrom, and S.H. Mou. 1997. *Emerging Markets for Outdoor Recreation in the United States*. Sporting Goods Manufacturers Association and the Outdoor Products Council. April.

[54] The 1994-95 survey is useful because of its in-depth examination of different types of recreation but it does not tell the entire story and one should not rely solely on it to discern the economic characteristics of participants in specific recreational activities. For example, a 2001 national survey of fishing, hunting, and wildlife-watching found that highly educated people represent: 20 percent of big game hunters, 22 percent of all hunters, 26 percent of all anglers, and 22 percent of freshwater anglers. Of all U.S. households, 17 percent have income of $75,000 or more, but 22 percent of all hunters, 20 percent of big game hunters, 24 percent of all anglers, and 22 percent of all freshwater anglers have incomes higher than $75,000. U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Bureau of the Census. 2002. *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation*. October. http://www.census.gov/prod/2002pubs/ FHW01.pdf (accessed December 12, 2005).

[55] *See*, for example, Dissart, J.-C. and D.W. Marcouiller. 2004. *Impact of Outdoor Recreation Facilities on Rural Economic Growth*. Conference on Natural Amenities and Rural Development, June 18-19, University of Wisconsin-Madison. May 14. http://www.wisc.edu/urpl/otherlinks/ARD_CONF/Papers/ DissartMarcouiller.pdf (accessed December 6, 2005).

[56] Deller, S.C., T.-H. Tsai, D.W. Marcouiller, and D.B.K. English. 2001. "The Role of Amenities and Quality of Life in Rural Economic Growth." *American Journal of Agricultural Economics* 82 (2): 352-365.

conflict with those of the long-term residents.

The overall effects of such changes remain ambiguous, however. One recent study, for example, found the long-term residents of rural counties with high concentrations of natural-resource amenities and/or high concentrations of recreational businesses had higher incomes than counterparts in counties lacking these attributes, but the higher incomes were offset, more or less, by higher costs of living.[57] Several more extensive analyses that looked across the national landscape, however, have found that indicators of socioeconomic well-being generally are higher in rural areas where resource-related recreational activities have emerged than in areas where they have not. These statements, from a recent overview of the relationship between resource-related recreation and the well-being of rural areas ratify this conclusion:

> Rural tourism and recreational development leads to higher employment growth rates and a higher percentage of working-age residents who are employed. Earnings and income levels are also positively affected. Although the cost of living is increased by higher housing costs, the increase offsets only part of the income advantage.
>
> Rural tourism and recreational development results in lower local poverty rates and improvements in other social conditions, such as local educational attainment and health (measured by mortality rates). Although rates of serious crimes are elevated with this kind of development, this may be misleading because tourists and seasonal residents, while included as victims in the crime statistics, are not included in the base number of residents. Rapid growth brings its own challenges, particularly pressures on infrastructure. The one growth-strain measure examined in the study, commuting time to work, revealed little evidence of traffic congestion in rural recreation areas.
>
> Rural recreation counties have not benefited equally. Rural counties with ski resorts were among the wealthiest, healthiest, and best educated places in the study, while those with reservoir lakes or those located in the southern Appalachian mountains were among the poorest and least educated.[58]

Rural areas of the U.S. will face an even greater challenge wrestling with these issues in the future, if growing population and incomes lead to growing expenditures on natural-resource-related recreation.[59] At the same time, many, if not most communities will face different challenges associated with interactions between economic growth and the nonuse values of natural-resource amenities. We describe this relationship in the following discussion.

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[57] Hunter, L.M, J.D. Boardman, and J.S. Onge. 2004. *The Association between Natural Amenities, Rural Population Growth, and Long-Term Residents' Economic Well-Being*. Research Program and Environment and Behavior, University of Colorado. Working paper. EB2004-0005. September. http://www.colorado.edu/ibs/pubs/eb/eb2004-0005.pdf (accessed December 9, 2005).

[58] Reeder, R.J. and D.M. Brown. 2005. *Recreation, Tourism, and Rural Well-Being*. U.S. Department of Agriculture, Economic Research Service. Economic Research Report Number 7. August. http://www.ers.usda.gov/publications/err7/err7.pdf (accessed November 2, 2005)

[59] Wilkerson, C. 2003. "Travel and Tourism: An Overlooked Industry in the U.S. and Tenth District." *Economic Review, Federal Reserve Bank of Kansas City* (Third Quarter): 45-67.

C. Natural-Resource Amenities, Environmental Values, and Economic Growth

To this point we have considered the ability of natural-resource amenities to exert a direct influence on the economic growth of communities and states, by nudging household-location decisions or by generating jobs in recreation and other amenity-related industries. In each of these mechanisms of amenity-driven growth, people are aware of the amenities, place a value on them, and alter their behavior in response to the value. Sometimes, though, the amenity, its value, and its influence on growth are less obvious. We consider two such circumstances. One involves the nonuse values people place on species and special places, even though they have no intent to use them. The other involves ecosystem services that, although highly valuable, generally remain unnoticed or taken for granted.

Nonuse Values

Sometimes people place an economic value on a natural-resource amenity even though they do not use it, interact with it, or have any intent to do so. Many people, for example, place a value on ensuring that species do not go extinct, even species unfamiliar to them. Many people place a value on and want to protect special places, such as the Grand Canyon, even though they live far away and do not intend to visit. Many people also place a value on and want to protect more familiar places and things, such as a rural community and lifestyle, or a local landscape or river not so they can take advantage of them but so future generations can do so. Economists call these nonuse values.

Nonuse values can be difficult to measure, even to recognize, because they generally do not manifest themselves in identifiable behavior. Unlike a river's scenic value, which can be measured by looking at the impacts on nearby property values, or its recreational value, which can be measured by looking at expenditures on river-related recreational activities, there are no analogous variables for measuring the value people place on ensuring that future generations will be able to enjoy the scenic views and recreational opportunities.

Insofar as nonuse values do not alter people's behavior, they exert no influence over economic growth. Sometimes, though, they can become manifest and exert considerable influence. Nonuse values, for example, can motivate people to express their preferences in political processes, pushing for regulations and/or incentives that make it more costly for others to engage in activities harmful to an endangered species or to destroy the current character of a particular landscape. Or, nonuse values can more directly induce a change in people's behavior, although the change often is hard to document. Seeing that a fish species is at risk of

extinction, they might use less water in their daily lives or corporate operations, for example, recognizing that to do otherwise would lead to higher fish-protection costs for future generations.

To estimate the nonuse values of species, landscapes, and other resources, economists often use a sophisticated process that entails asking people how much money they would be willing to pay to protect them. After the 1989 *Exxon Valdez* oil spill, for example, economists conducted a survey throughout the U.S. to estimate the nonuse value Americans placed on the resources of Prince William Sound. Other studies document nonuse values for at-risk species in the contiguous 48 states. In one of these, researchers asked respondents in Utah, Arizona, New Mexico and Colorado to express their willingness to pay to increase in-stream flows along 2,000 miles of six rivers that have habitat important for conserving nine species of fish that had been listed as threatened or endangered under the federal Endangered Species Act.[60] Respondents indicated that, on average, they would be willing to make a one-time payment of $306.12 per household to protect in-stream flows and other components of habitat. In another, similar survey New Mexican households expressed a willingness to pay about $35 each to ensure there is sufficient instream flow to protect one of the nine fish species.[61]

Another perspective on nonuse values comes from a review of several studies of the overall economic effects of activities to protect at-risk species. The author concluded that the benefits of such actions typically outweigh the costs.[62] This study, however, embraced both use values and nonuse values—reflecting the difficulty in distinguishing between the two.

Some research has documented the nonuse value associated with people's desire to see a cultural heritage passed to future generations. Anecdotal evidence indicates, for example, that some ranchers could earn higher incomes by allowing their land to be developed but decline to do so, preferring instead to pass the ranching lifestyle and landscape to the next generation. The findings of some economic studies are consistent with this evidence, though they have difficulty distinguishing nonuse values from resource-use values. In response to a 1993 survey, for example, residents of Routt County, Colorado, indicated a willingness, on average, to pay $135, $231, $292, and $324 per household, respectively, to protect 25, 50,

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[60] Loomis, J.B. 1998. "Estimating the Public's Values for Instream Flow: Economic Techniques and Dollar Values." *Journal of the American Water Resources Association* 34 (5): 1007-1014. We converted the study's findings to the equivalent value in the dollars of 2005.

[61] Berrens, R.P., P. Ganderton, and C. Silva. 1996. "Valuing the Protection of Minimum Instream Flows in New Mexico." *Journal of Agricultural and Resource Economics* 21 (2): 294-309. We converted the study's findings to the equivalent value in the dollars of 2005.

[62] Loomis, J.B. and D.S. White. 1996. "Economic Benefits of Rare and Endangered Species: Summary and Meta-Analysis." *Ecological Economics* 18: 197-206.

75, or 100 percent of the existing ranchland.[63] Some of this value apparently came from residents' desire to maintain open space and scenery for their own use. Part of it, however, apparently reflected a desire to maintain these features for future generations.

Another study in Colorado examined efforts by governments and non-governmental land trusts to prevent development of ranchlands by purchasing either land outright or conservation easements.[64] The authors found that such purchases, covering 18,849 acres on the west slope had an average price of $1,889 per acre, and purchases covering 82,364 acres in the mountains had an average price of $3,577 per acre. The authors concluded:

> The value of agricultural lands should be recognized not only for its market values, but also for the non-market values. Studies suggest that keeping lands profitable in agriculture can be the basis for protecting landscapes as open space and wildlife habitat.

Presumably, at least some people contributing money for these purchases desired the open space and habitat not just for their own use, but to extend the cultural heritage associated with them.

Nonuse values associated with the interaction between natural resources and cultural heritage can extend beyond traditional ranching. A recent global study of ecosystems and human well-being reached this conclusion:

> The impact of the loss of cultural services is particularly difficult to measure, but it is especially important for many people. Human cultures, knowledge systems, religions, and social interactions have been strongly influenced by ecosystems. A number of … sub-global assessments found that spiritual and cultural values of ecosystems were as important as other services for many local communities, both in developing countries (the importance of sacred groves of forest in India, for example) and industrial ones (the importance of urban parks, for instance). … Wealthy populations of people are insulated from the harmful effects of some aspects of ecosystem degradation, but not all. For example, substitutes are typically not available when cultural services are lost.[65]

In sum, many types of natural-resource amenity can have nonuse values. The value an individual person or household places on the amenity may, in the overall scheme of things, be small, but the aggregate value may be large if thousands, even millions, of people feel the same way. Nonuse values generally are invisible until they motivate people to take some action, individually or collectively, to keep these values from being lost.

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[63] We have converted the values reported in the study to their equivalents in the dollars of 2005.

[64] Loomis, J., V. Rameker, and A. Seidl. 2000. *Potential Non-Market Benefits of Colorado's Agricultural Lands: A Review of the Literature.* Colorado State University, Department of Agricultural and Resource Economics. Agricultural and Resource Policy Report. APR-00-02. February. http://dare.agsci.colostate.edu/csuagecon/extension/docs/landuse/agland.pdf (accessed November 29, 2005).

[65] Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-Being: Synthesis.* Washington, D.C.: Island Press, pp. 9-10.

Unnoticed Ecosystem Services

Ecosystems produce many valuable services that most people, perhaps all, take for granted. Some, such as microscopic activities that cycle energy, carbon, and nutrients, help sustain life in a particular place or even globally. Others make living in a place less costly by controlling pests, removing pollutants from surface water, etc.

These services, though unnoticed, can have a substantial impact on economic growth. Often, their importance is realized only after an ecosystem has lost its ability to provide them. The consequences can be dramatic, as when the loss of coastal wetlands apparently worsened the damage from Hurricane Katrina.[66] Less dramatic events also can reveal the value of ecosystem services. For example, having spent more than $1 billion to manage stormwater runoff system, business and civic leaders in Portland, Oregon, are considering relying more on the ecosystem's capabilities to avoid incurring even greater costs. Many communities, including two in Nebraska—the Village of Nemaha and Hansen Lakes Development—are relying on wetlands to treat wastewater.

Much of the research on the value of largely unnoticed ecosystem services has focused on wetlands and riparian areas. Table 4 identifies goods and services produced by wetlands, as well as the ecosystem functions that generate them. Table 5 highlights the findings of some of the studies reported by the Environmental Protection Agency, in a recent review that compared the costs associated with relying on wetlands and riparian areas to provide services with the costs of the engineered systems communities must rely on after they have degraded the ecosystem. Tables 6 and 7 present some of the findings from two recent reviews of studies that have estimated the values of services provided by wetlands. The studies examined wetlands in different locations that provided different types of services to local economies with different characteristics. From the underlying studies, the authors of the reviews concluded that wetlands produce such a complex set of services, it is difficult to estimate their total value.[67] Hence, the authors of the review represented in Table 6, which is the same as the study represented in Table 4, estimated the value per acre of hypothetical wetlands producing only one type of service.

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[66] Louisiana Hurricane Resources. 2006. *Barrier Islands & Wetlands.* http://www.laseagrant.org/hurricane/archive/wetlands.htm (accessed June 26, 2006).

[67] Woodward, R.T. and Y.S. Wui. 2001. "The Economic Value of Wetland Services: A Meta-Analysis." *Ecological Economics* 37 (2): 257-270, and Heimlich, R.E., K.D. Wiebe, R. Claassen, D. Gadsby, and R.M. House. 1998. *Wetlands and Agriculture: Private Interests and Public Benefits.* Economic Research Service, U.S. Department of Agriculture. Washington, D.C. Agricultural Economic Report 765.

Table 4: Wetland Functions, and the Economically Valuable Goods and Services They Produce

Function	Economically Valuable Good(s) or Service(s)
Recharge of groundwater	Increased water quantity
Discharge of ground water	Increased productivity of downstream fisheries
Water quality control	Reduced costs of water purification
Retention, removal, and transformation of nutrients	Reduced costs of water purification
Habitat for aquatic species	Improvements in commercial and/or recreational fisheries either on or offsite. Nonuse
Habitat for terrestrial and avian species	Recreational observation and hunting of wildlife. Nonuse
Biomass production and export (both plant and animal)	Production of valuable food and fiber for harvest
Flood control and storm buffering	Reduced damage due to flooding and severe storms
Stabilization of sediment	Erosion reduction
Overall environment	Amenity values provided by proximity to the environment

Source: Woodward, R.T. and Y.S. Wui. 2001. "The Economic Value of Wetland Services: A Meta-Analysis." *Ecological Economics* 37 (2): 257-270.

The variation in value, from one wetland to another, is so great that the values in Tables 6 and 7 probably cannot, in and of themselves, provide a reliable, quantitative estimate of the value of services provided by any specific wetland. Instead, one would have to augment the values reported in these tables with additional research to determine the value of goods and services provided by a specific wetland. The data in the tables do, however, support some qualitative conclusions regarding economic values associated with wetlands. The data in Table 6 indicate, for example, that, when measured in terms of the value per acre of wetland, people generally place a higher value on the services associated with improving bird watching than on any other service shown in Table 6.

For the most part, the unnoticed services provided by ecosystems have received little attention. Increasingly, though, ecologists, economists, and communities are paying attention.[68] Many towns—including some in Nebraska—are using wetlands to treat municipal waste water, for example, and others are increasingly relying on urban forests to provide

[68] *See*, for example, Daily, G.C. 1997. *Nature's Services: Societal Dependence on Natural Ecosystem*. Washington, D.C.: Island Press.

Table 5. Economic Benefits from Wetlands and Riparian Areas

Economic Benefit Derived from Wetlands and Riparian Areas	Estimated Amount
Loss of wetlands increased dredging costs downstream (California)	$2.8 million
Loss of swamp lands and their ability to cleanse surface water increased the costs associated with a community's water-treatment facility. (South Carolina)	$5 million
Loss of wetlands and their ability to cleanse surface water caused a community to incur additional sewer-system costs. (Pennsylvania)	$1.5 million
Loss of wetlands and their ability to store water causes communities to build additional storage facilities. (Minnesota)	$1.5 million per year for 5,000 acres of wetlands lost each year.
Preserving wetlands, and their ability to absorb floodwater, allowed communities to avoid building dams. (Massachusetts)	$10 million purchase of wetlands offset $100 million cost of dams.
Restoration of vegetation on streamside lands, and their ability to absorb floodwater, allowed communities to avoid costs of stormwater-control facilities. (Kansas)	$600,000 cost of restoration precluded $120 million cost of stormwater facilities.
Protection and restoration of riparian vegetation enabled a community to avoid costs of dredging and wastewater treatment. (Oregon)	$660,000 annual cost of restoration precluded $1.6 million annual cost of dredging and wastewater treatment.
Establishment of vegetation along waterways to filter pollution from runoff from nearby lands reduced water treatment costs. (Iowa)	$2.7 million per year.
Improvement of riparian vegetation reduced sediment in waterways, reduced water-treatment costs, and improved agricultural production. (Ohio)	$2.7 million.

Source: ECONorthwest, adapted from U.S. Environmental Protection Agency. 2005. *National Management Measures to Protect and Restore Wetlands and Riparian Areas for the Abatement of Nonpoint Source Pollution*. Office of Water. EPA 841-B-05-003. July. http://www.epa.gov/owow/wetmeasures/ (accessed December 16, 2005).

cooling shade and help regulate stormwater runoff. Growing concerns about global climate change are stimulating numerous efforts to understand and promote the ability of different resource-management strategies to sequester carbon dioxide. As these and similar efforts lead to better understanding of the nature and value of the services ecosystems provide, demand from households, firms, and communities for their protection and enhancement is likely to become more manifest.

Table 6. Estimated Value per Acre of Single-Service Wetlands

Service	Value per Acre[a]
Reduce flood damage	$393
Improve water quality	$417
Recharge groundwater	$127
Improve recreational fishing	$357
Improve bird hunting	$70
Improve bird watching	$1,212
Improve amenities for nearby homes	$3
Provide fish and wildlife habitat	$306
Stabilize sediment	$237

Source: Woodward, R.T. and Y.S. Wui. 2001. "The Economic Value of Wetland Services: A Meta-Analysis." *Ecological Economics* 37 (2): 257-270.

[a] Mean value of estimates in diverse studies. Values measured in the dollars of 1990.

Table 7. Economic Value of Goods and Services Produced by Wetlands, Summary of Studies, 1970 to 1996

Goods and Services	Mean Value per Acre Reported by Studies[a]
Marketed goods	
Fish and shellfish support	$7,612
Fur-bearing animals	$170
Nonmarketed goods and services	
General value to nonusers	$103,233
General value to users	$3,118
Fishing value to users	$8,157
Hunting value to users	$1,264
Recreation: value to users	$1,414
Amenity and cultural value to users and nonusers	$3,379

Source: ECONorthwest, with data from Heimlich, R. E., K. D. Wiebe, R. Claassen, D. Gadsby, and R. M. House. 1998. *Wetlands and Agriculture: Private Interests and Public Benefits.* Economic Research Service, U.S. Department of Agriculture. Washington, D.C. Agricultural Economic Report 765, p. 15.

[a] We converted values in the original study to their equivalent in the dollars of 2005.

Text Box 3 returns to the study of the Necedah National Wildlife Refuge, discussed in the preceding text boxes, to illustrate economists' efforts to estimate nonuse values and the value of those ecosystem services that generally go unnoticed. From studies conducted elsewhere, the authors concluded it was reasonable to assume that adult residents of Wisconsin are willing to pay between $12.33 and $32.33 (in the dollars of 1996) per

Text Box 3
Economic Consequences of Expanding the Necedah National Wildlife Refuge, Part III: Preservation Value

In 1998 the U.S. Fish and Wildlife Service examined the potential economic consequences of expanding the Necedah National Wildlife Refuge, in central Wisconsin, by acquiring 18,100 acres along the Yellow River.[a] The objective would be to protect and enhance breeding habitat for migratory birds, waterfowl, and other wildlife, and to maintain an important corridor for birds, birds, butterflies, and other migratory species. The area is nearly level, with sandy soils, a sinuous stream with many oxbows, small ponds, and n predominant plant community of riparian (streamside) forest.

The study estimated the value adult residents of Wisconsin place on preserving the refuge and its natural environment.

Estimated Value of Preserving the Refuge

	Low Estimate	High Estimate
Value per adult resident of Wisconsin	$12.33	$32.44
Total value	$47 million	$124 million
Value per acre	$2,600	$6,800

[a] Malloy, S.J., R.E. Unsworth, and E.A. Blomdahl. 1998. *Economic Assessment for the Necedah National Wildlife Refuge Comprehensive Conservation Plan*. U.S. Department of Interior, Fish and Wildlife Service. March. http://www.indecon.com/NWR%20Economic%20Analyses/Necedah_NWR.pdf (accessed December 10, 2005). Value measured in the dollars of 1996.

person to preserve the refuge. This range, multiplied by the state's adult population, indicates that the refuge's total preservation value is $47–$124 million, and its value per acre is between $2,600 and $6,800. These estimates represent the total value of preserving the refuge, taking into account use values as well as nonuse values, and ecosystem services that are known as well as those that are not. The estimates of total value per acre, however, markedly exceed the estimates of recreation-use values (consumer's surplus plus expenditures) described in Text Boxes 1 and 2, indicating that the sum of the nonuse value and the value of unnoticed ecosystem services exceeds $2,000 per acre.

D. Natural-Resource Amenities and Feedback Benefits to Dominant Commercial Uses of the Resources

Ecosystems typically cannot meet all demands. Hence, if the dominant commercial demand in a place has no ability to conserve resources, the economic benefits from increasing the supply of amenities typically can be accomplished only by reducing the benefits from the dominant use. If a farmer is using water with maximum efficiency, for example, increases in stream flow could occur only if he reduced his irrigation, lowering crop

production and profits. These tradeoffs raise an important resource-management question: Will the increase in some benefits outweigh the decrease in others? If so, then shifting resources from the dominant commercial use to providing amenities will increase the resources' overall contribution to economic well-being. If not, then the economy will be better off if the resources continue to support the dominant commercial use.

In some cases, though, this competitive tradeoff can be sidestepped. As we demonstrate in the next section, some research shows many farmers could increase profits by diminishing their use of water, leaving more in streams. Electricity systems could become more efficient by conserving, not producing more electricity. Shifting resources to increase the supply of amenities can benefit not only amenity-related sectors of the economy but also the households, firms, and communities linked to the farming, hydropower, and other dominant commercial uses. Below, we summarize some of the evidence supporting this conclusion, focusing on agriculture. First, we highlight some of the economic challenges confronting many farm families. Then, we describe how increased emphasis on protecting, enhancing, and taking advantage of natural-resource amenities might offer relief from some of these challenges.

Some Economic Challenges in the Farm Sector

America's farm sector faces some serious economic challenges. The ability of farming operations to generate enough income to provide a high standard of living for farm families and farm workers has been declining, and there is little reason to believe this trend will reverse itself in any significant manner. For most farms, what they receive when they sell their crops and livestock is less than the costs they incur to produce them. To compensate, many farms receive federal subsidies, passing at least some of their excess costs to the families and businesses that support them through their tax payments. Some farming practices also impose additional costs on others by emitting pollutants into the air, streams, and ground water, or by consuming water and soil resources faster than the environment can provide them on a sustainable basis.[69]

We make these observations not to disparage farming or to assemble a comprehensive discussion of the farm economy. Instead, they serve our purposes to focus on just one aspect: farming's inability to generate enough income to support farm families, forcing most of these families to rely on income from off-farm sources if they are to continue farming.

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[69] Gilliom, R.J., J.E. Barbash, C.G. Crawford, P.A. Hamilton, J.D. Martin, N. Nakagaki, L.H. Nowell, J.C. Scott, P.E. Stackelberg, G.P. Thelin, and D.M. Wolock. 2006. *The Quality of Our Nation's Waters: Pesticides in the Nation's Streams and Ground Water, 1992-2001*. U.S. Geological Survey. Circular 1291.

Off-farm employment is more than just an afterthought. Nearly 1 million farm operators do not see farming as their primary job, and three-quarters of these do not see farming as their career of choice.[70] Nearly 500,000 spouses of farm-operators work off the farm. Three-fourths of farm households earned more than half their annual income from off-farm sources in 2000-01, mostly in the form of wages and salaries from off-farm employment. Off-farm employment provides more than just income; many off-farm jobs give farm families access to health-insurance coverage and other benefits.

Tables 8A and 8B demonstrate the extent to which farm families in America depend on other sectors of the economy to make their living. For more than one million farm families, their farming operations lost money in 1998, and their off-farm earning filled the gap. All but those families associated with the very largest farms—61,273 out of more than 2 million—depended on off-farm earnings for a large portion, if not the majority of their net incomes.

This deep dependence on off-farm sectors of the economy means that, to a great extent, the ability of these sectors to generate jobs and income will determine the future ability of farm families to continue farming. The economic structure of many rural areas has been turned on its head. Where once farming determined the viability of non-farm sectors of the economy in rural communities, now these non-farm sectors determine the viability of farming.

Among other things, this shift in economic structure undermines the utility of the so-called economic-base model of economic growth. This model asserts that agriculture and other resource-intensive industries form an economy's base, on which all other industries rest. Hence, the model asserts that these basic industries play a special role, relative to other sectors, in the evolution of local and regional economies. According to this model, the economic well-being of nearby workers, families, businesses in non-farm sectors is dependent on agriculture: if agriculture falters, the economic base weakens, and the whole economy starts to topple. Certainly, what happens in the farm sector and other resource-intensive industries affects the economic well-being of many workers, families, and businesses associated with other sectors, as well as the ability of governments to address social needs. But the converse also is true: the well-being of the so-called basic industries depends on other sectors, such as telecommunications and finance, and on the availability of schools, roads, and other social services. For some time now, the farm sector has not had enough economic strength to provide for the well-being of many farm families, and has lacked the strength to support robust rural economies. Identifying the farm sector as having a special, basic role in the economy does not coincide with current economic reality.

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[70] Newton, D.J. and R.A. Hoppe. 2001. "Financial Well-Being of Small Farm Households Depends on the Health of Rural Economies." *Rural America* 16 (1): 2-10.

Table 8A. Incomes of Family Farms, by Type, 1998

	Households		Income	
Group	**Number**	**Percent**	**Average**	**Percent from Off-Farm[a]**
All	2,022,413	100	$59,734	88.1
Small family farms				
Limited-resource	150,268	5.2	9,924	132.5
Retirement	290,938	14.4	45,659	103.3
Residential/lifestyle	834,321	41.2	72,081	106.0
Farming-occupation				
Low-sales	422,205	20.1	34,773	106.9
High-sales	171,469	8.5	50,180	57.2
Large family farms	91,939	4.6	106,541	44.4
Very large family farms	61,273	3.0	209,105	15.9

Table 8B. Off-Farm Work by Farm Operators and Spouses, 1999

	Percent of All Family Farms
Operator works off-farm	58.0
Type of work	
Employed by another farm	3.0
Employed by a private firm	52.9
Employed by government	15.1
Self-employed, nonfarm business	21.5
Other	4.7
Spouse works off-farm	47.3
Type of work	
Employed by another farm	0.7
Employed by a private firm	55.7
Employed by government	27.6
Self-employed, nonfarm business	11.8
Other	3.4

Source: ECONorthwest, adapted from Newton, D.J. and R.A. Hoppe. 2001. "Financial Well-Being of Small Farm Households Depends on the Health of Rural Economies." *Rural America* 16 (1): 2-10.

[a] Income from off-farm sources can be more than 100 percent of total household income if earnings of the operator household from farming activities are negative.

Where the off-farm economy is not sufficiently strong, farm families that depend on it for a substantial portion of their net income either live with incomes below what families enjoy elsewhere or they leave. Many live with incomes below the poverty line. This is especially true in the northern Great Plains. Montana, the Dakotas, and Nebraska contain 17 of the 20 poorest counties in America, measured in terms of earnings. Much of this area is losing population.

Many economists have concluded that the farm sector, with its current structure, cannot overcome these challenges. This conclusion extends even to the massive flow of money into farm communities in the form of farm subsidies. Receiving money from the government, it seems, can have a debilitating economic impact, as indicated in this assessment by an economist with the Federal Reserve Bank of Kansas City:

> Farm payments are not providing a strong boost to the rural economy in those counties that most depend on them. Job gains are weak and population growth is actually negative in most of the counties where farm payments are the biggest share of income. … Job growth is decidedly weak in the counties most dependent on farm payments. The vast majority of such counties (483) had job gains below the 19% national average from 1992 to 2002. A considerable number (167) had outright job losses over the period. Only a sixth of the farm-dependent counties had above average growth in employment. These counties generally have two characteristics: [they are near metro areas or emerging retail trade centers]. … Farm payments have an even weaker impact on population growth. In fact, the vast majority of counties (461) are actually losing population. ... If anything, [farm] payments appear to be linked with subpar economic and population growth. To be sure, this quick comparison cannot answer whether growth would have been even weaker in the absence of the payments. Still, farm payments appear to create dependency on even more payments, not new engines of growth.[71]

Of course, our description of the challenges in the farm sector does not apply to all farms. And in no way does this discussion disparage the farming industry or farmers themselves. Indeed, as many have pointed out, these challenges ironically stem largely from the incredible success farmers have had in increasing output over the years. Nonetheless, these challenges now exist. A former Administrator of USDA's Economic Research Service has estimated that only one-third of farm operations producing corn and other major commodities are sufficiently efficient and thus their survival is not in question.[72] The remainder survive only by accepting subsidies, supplementing their income or accepting diminution in their standard of living. In Nebraska, for example, about 65 percent of

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[71] Drabenstott, M. 2005. *Do Farm Payments Promote Rural Economic Growth?* Federal Reserve Bank of Kansas City, Center for the Study of Rural America. March.

[72] Offutt, S. 2000. *Can the Farm Problem Be Solved?* M.E. John Lecture, the Pennsylvania State University. http://www.aers.psu.edu/Announce/AESeminar/offutt.pdf (accessed November 28, 2005).

farms have received more than $8 billion in federal subsidies between 1995 and 2004.[73]

Amenity-Driven Growth May Offer Relief for These Challenges

Some areas may be able to alleviate farm-related challenges by making a greater effort to produce and capitalize on their natural-resource amenities. These benefits might materialize if, as we discuss above, resource-related amenities generate new job opportunities, some of which will be accessible to farm operators and/or their spouses. Farming operations may also benefit more directly: they may be able to increase their net earnings by diminishing current, adverse effects on water quality and other amenities; or the attraction of people to nearby amenities may result in an increased demand for some of their products.

Off-Farm Job Opportunities. We know of no research that has specifically identified the opportunities for particular areas, or determined what must be done to capitalize on them.[74] The general challenge, though was described by researchers who examined the conditions under which rural areas might attract workers and investors associated with industries in the so-called new economy:

> Except where there are colleges and universities or amenities attractive to professional workers (attractive scenery, good weather, recreational or cultural opportunities, good schools) rural areas do not have a large enough professional-level workforce to attract or develop 'new economy' industries. As information technology develops, it may overcome the disadvantages of fewer face-to-face contacts so that consultants, financial professionals, accountants, and software developers can live and work in rural areas. Still rural areas must offer natural amenities, good schools, access to transportation networks, and other infrastructure to attract high-wage professionals who work in 'new economy' industries. An educated, trainable workforce is also important to attract service and high-tech jobs. Without these jobs, the earnings gap between urban and rural America is likely to continue widening.[75]

Additional support for the notion that amenity-driven growth may reinforce the farm sector, in some areas, comes from documentation of the economic effects of the Conservation Reserve Program (CRP) on rural economies. Many have feared that participation in the CRP, by taking land out of agricultural production and devoting it to environmental protection, necessarily would harm local economies. To test the validity of

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[73] Environmental Working Group. 2005. "Farm Subsidy Database: Nebraska." http://www.ewg.org/farm/region.php?fips=31000 (accessed January 25, 2006)

[74] For a general discussion, *see* Newton, D.J. and R.A. Hoppe. 2001. "Financial Well-Being of Small Farm Households Depends on the Health of Rural Economies." *Rural America* 16 (1): 2-10.

[75] Gale, F. and D. McGranahan. 2001. "Nonmetro Areas Fall Behind in the 'New Economy'"." *Rural America* 16 (1): 44-52. http://ers.usda.gov/publications/ruralamerica/ra161/ra161g.pdf (accessed December 19, 2005).

this view, researchers looked to see if counties with large acreage in the CRP had different experiences from those with little acreage.[76] They concluded the differences are not substantial. Counties with large acreage in the CRP and those with little have had similar experiences in attracting beginning farmers or retaining farm operators. They also had similar patterns of change in population, so that the authors concluded they found "no statistical evidence to support the commonly held belief the CRP encourages rural outmigration. … There may be specific cases where CRP enrollment had a positive or negative effect on population, but in general, CRP enrollment is unrelated to underlying population trends." They also found that the CRP has had some beneficial impacts on some local economies by triggering additional recreational expenditures. For the program as a whole the additional expenditures have totaled $300 million dollars per year.

Higher Net Farm Earnings. Some farming practices waste water, soil, energy, and/or agricultural chemicals and this waste, in turn, degrades the quality of water and other resources. Reducing this waste sometimes can yield double benefits: increases in net farm earnings and improvements in the quality of a natural-resource amenity.

Farmers already have accomplished substantial environmental improvements and received compensation for doing so. For example, they have enrolled more than 30 million acres in the CRP, receiving $45 per acre, on average, in 2000.[77] Even so, much evidence indicates farming operations are strongly correlated with pollution levels for sediment, nitrate, phosphorus, and fecal coliform bacteria in streams that exceed national standards for safe swimming.

Extensive research illustrates the advantages of doing even more to curtail wasteful practices that harm environmental amenities. One study, conducted in Missouri, compared returns farmers could expect to earn from conventional agricultural systems that concentrate on maximizing acreage used to produce corn, soybeans, and/or wheat with the returns they could expect from growing trees, shrubs or grasses in shallow drainage areas known as draws.[78] The authors found that the alternative practices could increase farmers' earnings per acre of land in the draws as

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[76] Sullivan, P., D. Hellerstein, L. Hansen, R. Johansson, S. Koenig, R.N. Lubowski, W. McBride, D.A. McGranahan, M.J. Roberts, S. J. Vogel, and S. Bucholtz. 2002. *The Conservation Reserve Program: The Implications for Rural America*. U.S. Department of Agriculture, Economic Research Service. Agricultural Economic Report 834. September.

[77] Claassen, R., L. Hansen, M. Peters, V. Breneman, M Weinberg, A. Cattaneo, P. Feather, D. Gadsby, D. Hellerstein, J. Hopkins, P. Johnston, M. Morehart, and M. Smith. 2001. *Agri-Environmental Policy at the Crossroads: Guideposts on a Changing Landscape.* U.S. Department of Agriculture, Economic Research Service. Agricultural Economic Report Number 794. January. http://www.ers.usda.gov/publications/aer794/aer794.pdf (accessed December 6, 2005).

[78] Qiu, Z., T. Prato, L. Godsey, and V. Benson. 2002. "Integrated Assessment of Uses of Woody Draws in Agricultural Landscapes." *Journal of the American Water Resources Association* 38 (5): 1255-1269.

much as tenfold. Another study in Missouri compared a scenario in which land would be managed with conventional farming techniques with a more environmentally sound alternative.[79] The authors found the alternative, which entailed more expenditures on labor and management to curtail adverse environmental impacts, would increase direct farm income by 40 percent. It also would increase the multiplier effects on the economy of the nearby community by 25 percent. In an analysis of the effects of the CRP, researchers found that the program's positive impacts on the productivity of agricultural soils was worth about $200 million.[80]

To a great extent, the promise of higher earnings applies only to individual farmers: if they take environmentally-friendly actions they will reap the rewards. Some actions, though, will yield benefits for the farm sector as a whole. In one extensive analysis of the interaction between wetlands and agriculture, for example, the authors concluded that converting an additional 5.8 – 13.2 million acres of wetlands to agricultural production would induce a long-run reduction of $371.8 – $870.6 million in farm income in the Northern Plains.[81] Presumably, the reverse also would be true, more or less: converting agricultural lands back to wetlands would induce an overall increase in farm income. In a subsequent analysis of the CRP, researchers found that, when the program takes land out of agricultural production, the amount of farm products falls but the prices of these products rise more rapidly and, hence, overall commodity-related farm income rises.[82]

Increased Demand for Farm Products. As natural-resource amenities attract visitors and residents to an area, some nearby farmers may experience increased demand for their products. Restaurants, passers-by, or shoppers at farmers' markets, for example, may increase their purchases of locally grown produce and meat.

Some visitors may combine their participation in resource-related activities, such as fishing and sight-seeing, with farm-related recreational activities that are collectively known as agritourism. Agritourism has received much attention in the past decade as farmers throughout the country have searched for alternative sources of income and sought to take advantage of economic and demographic changes that underlie the

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[79] Ikerd, J., G. Devino, G., and S. Traiyongwanich. 1996. "Evaluating the Sustainability of Alternative Farming Systems: A Case Study." *American Journal of Alternative Agriculture* 11 (1): 25-29.

[80] Research results reported in Smith, M.E. 2003. "Land Retirement." In *Agricultural Resources and Environmental Indicators, 2003*. Edited by R. Heimlich. U.S. Department of Agriculture, Economic Research Service. http://www.ers.usda.gov/publications/arei/ah722/ (accessed October 6, 2005).

[81] Heimlich, R.E., K.D. Wiebe, R. Claassen, D. Gadsby, and R.M. House. 1998. *Wetlands and Agriculture: Private Interests and Public Benefits*. Agricultural Economic Report 765. Washington, D.C., Resource Economics Division, Economic Research Service, U.S. Department of Agriculture.

[82] Smith, M.E. 2003. "Land Retirement." In *Agricultural Resources and Environmental Indicators, 2003*. Edited by R. Heimlich. U.S. Department of Agriculture, Economic Research Service. http://www.ers.usda.gov/publications/arei/ah722/ (accessed October 6, 2005).

growing demand for recreation generally. Results from research conducted in 1998 in Montana is illustrative.[83] A survey of farm and ranches found that 1,100 (5 percent) of them already were engaged in recreation-related activities, and an additional 1,540 (7 percent) anticipated they would become engaged within five years. A survey of farm- and ranch-related recreational businesses already in existence found that most operators had been in agriculture for more than 30 years and operated farms or ranches with more than 3,000 acres. On average, earnings from their recreation business represented 16 percent of total farm or ranch income. The ten activities reported most popular with recreationists were horseback riding, guided hunting, family-style meals, unguided hunting, cattle drives, riding herd, watching wildlife, fishing, nature walks, and cookouts.

Many farms and ranches already earn income by leasing land for use by recreationists. Data on leases compiled by the largest farm-and-ranch-management company in Nebraska and other Great Plains states indicate that, as a rough rule-of-thumb, landowners who lease land for hunting, earn about $10 – 20 per acre.[84]

In recent years researchers have recognized that proposed initiatives to limit and even roll back emissions of greenhouse gases may increase the demand for conservation-oriented products of farms and ranches. So far there is no way to predict with certainty the benefits for individual farms or groups of farms. Nonetheless, evidence indicates that, under some plausible programs, farms could receive considerable payments for taking land out of agricultural production or for changing tillage practices.[85] The authors of one analysis looked at a range of alternatives for 3.7 million acres in the Upper Mississippi River Basin (parts of Minnesota, Wisconsin, Iowa, Illinois, and Missouri), and concluded farmers could realize a net increase in earnings of $158 million by enlisting their lands in a carbon-sequestration program.[86] The authors also concluded that such a program probably would yield substantial improvements in the quality of streams in agricultural areas and other environmental benefits.

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[83] Sharpe, D. 1998. "Montana's Farm and Ranch Recreation Business Program." Presented at National Extension Tourism Conference—Tourism Innovations: Developments, Policy & Markets in Grantville, Pennsylvania. Northeast Regional Center for Rural Development. http://smallfarm.ifas.ufl.edu/Tourism/NETC-binder.pdf (accessed December 19, 2005).

[84] Personal Communication, David Nelson, Vice president for Conservation and Recreation Services, Farmers National Company. January 27, 2006.

[85] *See*, for example, Lewandrowski, J., C. Jones, R. House, M. Peters, M. Sperow, M. Eve, and K. Paustian. 2004. *Economics of Sequestering Carbon in the U.S. Agricultural Sector*. U.S. Department of Agriculture, Economic Research Service. Technical Bulletin 1909. April. http://www.ers.usda.gov/publications/tb1909/tb1909.pdf (accessed December 19, 2005).

[86] Feng, H., L.A. Kurkalova, and C.L. Kling. 2005. *Economic and Environmental Co-Benefits of Carbon Sequestration in Agricultural Soils: Retiring Agricultural Land in the Upper Mississippi River Basin.* Center for Agricultural and Rural Development, Iowa State University. Working Paper. 05-WP-384. February. http://www.econ.iastate.edu/research/webpapers/paper_12439.pdf (accessed December 19, 2005).

Amenity-driven growth in some areas may yield benefits for farmers and ranchers by increasing the demand for their assets. As more people are attracted to the resource-related amenities of an area, farmers often experience an increase in the demand for their land from households, developers, and investors. Researchers who analyzed the results of a survey of bankers in the states covered by the Federal Reserve Bank of Kansas City found this phenomenon is widespread:[87]

> [D]emand for farmland for recreational purposes is increasingly cited as a major force behind rising land values. For areas fitting the traditional definition of 'scenic' [this] is not new. However, recreational demand is expanding into more remote areas. Land suitable for hunting, fishing, and other recreational activities is increasingly in high demand.

In some instances, farmers may be able to sell water they conserve by retiring land from agricultural production or adopting conservation practices. The data in Table 9 illustrate recent prices for water purchased or leased in western states. A purchase entails permanent transfer of the right to the water; with a lease, the underlying water right remains unchanged, but the short-term usage of water is transferred from the seller to the purchaser. Most of the transactions reflected in Table 9 involve agricultural interests selling or leasing water to urban interests; the remainder generally involve acquisitions of water to accomplish environmental objectives. The prices of leased water ranged from $5 to $283 per acre-foot; those of purchased water from $201 to $3,451 per acre-foot. These numbers should be used with caution for they give, at best, only a rough indication of the prices people would pay for water in any particular place and time.

At least in concept, irrigators also might be able, under appropriate circumstances, to sell water not for instream flows or urban uses but to maintain water levels in reservoirs. Lower water levels in reservoirs correlate with lower visits by anglers and other recreationists. With low water levels in 2000, in southwestern Nebraska's Swanson and Enders Reservoirs, for example, visitation dropped by 12-14 percent and expenditures by anglers, many of whom come from Colorado, dropped more than $150,000.[88] A recent study of Lake McConaughy offers some insights into the value of reservoir water in Nebraska.[89] The authors found that, under 2005 conditions, recreationists were willing to pay $14.43 per visitor-day of recreation at the lake, but would be willing to pay an additional $1.42 per visitor-day if the reservoir were maintained at a slightly higher level. When the reservoir is at 20 percent of capacity,

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[87] Novack, N. 2005. *Agricultural Credit Conditions: Booming Farmland Values.* Federal Reserve Bank of Kansas City, Center for the Study of Rural America. June. http://www.kc.frb.org/RuralCenter/mainstreet/MSE_0605.pdf (accessed December 19, 2005).

[88] Nebraska Game and Parks Commission. No date. "Economic Benefits of Using Water for Recreation." (manuscript).

[89] Supalla, R.J. 2005. *Economics of Management Options for Lake McConaughy: Executive Summary.* University of Nebraska – Lincoln, Department of Agricultural Economics. December 13.

Table 9. Volume and Volume-Weighted Prices for Reported Water Transactions, 1999-2002

State	Volume (thousand acre-feet) Lease	Sale	Total	Lease/Sale Ratio	Price ($/acre-foot)[a] Lease	Sale
AZ	1,371	24	1,395	53	73	894
CA	3,127	227	3,354	14	80	1,207
CO	74	242	316	0.3	22	3,451[b]
ID	692	1	693	692	10	201
KS	4	0.2	4.2	20	51	—
MT	5	—	5	—	5	—
NM	338	10	348	34	66	1,233
NV	—	49	49	—	—	2,572
OK	10	—	10	—	59	—
OR	532	38	570	14	283	1,045
TX	877	322	1,199	3	81	864
UT	6	3	9	2	6	870
WA	68	13	81	5	53	513
WY	105	—	105	—	40	—
Total	7,211	929	8,140	8	86	1,299

Source: Howitt, R., and K. Hansen. 2005, "The Evolving Western Water Markets." *Choices.* 20:1 (1st Quarter). pp. 59-63. http://www.choicesmagazine.org/2005-1/environment/2005-1-12.pdf (accessed November 22, 2005).

[a] Prices measured in the dollars of 2004.

[b] Sales for Colorado-Big Thompson project omitted. If included the average sale price is $7,801.

adding 100,000 acre-feet would increase total recreation value by $1.4 million per year.

Another study, in Alabama, also provides information about the general magnitude of reservoir amenities.[90] The study described the extent to which fluctuations in the levels of six reservoirs in Alabama led to changes in the value of nearby residential property, expenditures on reservoir-related recreation, and reservoir-related nonuse values. It found that a permanent one-foot reduction in summer reservoir levels would reduce the value of lakefront property 4 – 15 percent and recreational expenditures 4 – 30 percent. Respondents to a survey who indicated they currently do not use the reservoirs nonetheless indicated a willingness to pay $47 per household, on average, to maintain the status quo.

In sum, there is extensive potential for farm families to reap benefits from

[90] Hanson, T.R., L.U. Hatch, and H.C. Clonts. 2002. "Reservoir Water Level Impacts on Recreation, Property, and Nonuser Values." *Journal of the American Water Resources Association* 38 (4): 1007-1018.

placing a greater emphasis on the production of natural-resource amenities. This potential is not being fully realized, however, raising the question, Why not? There is no single answer. Some farm operators may conclude they have better ways to maintain their profitability, some may see the production of amenities as too risky, and some may want to produce them but lack sufficient resources to do so. In some instances, the very nature of amenities, which often are enjoyed by society as a whole, conflicts with private ownership of property: a landowner has little incentive to incur costs to produce an amenity to be enjoyed primarily by others. The experience of timber-towns and fishing-communities that have switched from using natural resources to produce commodities to using them to produce amenities, indicates that inertia is a common impediment: many residents, especially those with long ties to commodity-related activities have difficulty seeing the amenity value of natural resources or themselves engaged in producing these amenities.

Whatever the reasons, significant potential for natural-resource amenities to improve the well-being of farm families remains unrealized. The pressures for change, however, are likely to grow in the foreseeable future, as farmers, in Nebraska and elsewhere, cope with powerful forces and trends, such as those associated with climate change, a population that is growing larger and more mobile, and increasing competition from agricultural exporting nations worldwide.

E. LOOKING FORWARD

The evidence we describe above demonstrates that natural-resource amenities exert powerful economic forces at the local, state, and national levels. These forces almost certainly will become even more powerful in the foreseeable future, as demand for amenities outstrips the supply.

Past trends indicate demand for amenities probably will grow more rapidly in the future than in the past. Demand for pleasant scenery, recreational opportunities, and similar amenities is likely to expand both as the nation's population grows and as it becomes wealthier, as the number of tourists rises, and as people and firms become more foot-loose and focused on quality of life. Unless there is a dramatic turnaround in ecological conditions or people's preferences, the future also will see growing demand for the protection of species and special landscapes. Better understanding of the services ecosystems provide and their value is likely to lead to increased recognition that relying on ecosystems for these services is cheaper than relying on engineered substitutes.

In contrast, the supply of resource-related amenities will remain far more constrained. Indeed, the supply of the most valuable amenities—mountains, lakes, seashores, and the like—will remain fixed. As demand for them grows, they will become more congested, diminishing their

attractiveness to some people, who will turn their attention elsewhere. As these areas also become congested, demand probably will spread to resources that currently go unnoticed. The demand also may stimulate actions to increase the supply of some amenities, by boosting the quantity and quality of water in streams, for example, or by enhancing the infrastructure to enable more people to use a given amenity.

This interaction between demand and supply will play out across the national (and international) landscape. Some amenities, currently overlooked, will catch the public's attention and generate amenity-driven growth, while others will not, at least for awhile. In some places this growth will manifest itself as a cacophony of tourism-related businesses and jobs, while in others the effect will be more subdued, as amenities attract households to a community or lower the costs of living there. Such transitions have long occurred in this country. Deep forests, large open areas, and other resource characteristics once seen as unattractive are now cherished. Many of the areas currently perceived as rich in natural-resource amenities, once were heavily logged, mined, or used for agricultural production. If history repeats itself, similar transitions will occur in some areas currently considered unattractive.

By describing our expectations that amenity-driven growth will become more important, we are not saying that such growth will come without cost. Some communities, possessing attractive amenities, will gain highly-educated workers at the expense of those that do not. Some communities that now enjoy social stability will experience turmoil as dominant uses of resources oriented toward agriculture and similar industries evolve into new uses oriented toward consumer services. Some amenities, especially those that are privately owned, will become accessible only to the rich.

These potential challenges are things to be managed, however, not reasons to ignore the economic importance of natural-resource amenities. Indeed, we believe the research we discuss above provides convincing evidence for applying nationwide this conclusion, which comes from the economists' letter regarding the relationship in western states between the environment and the economy:[91]

> [T]he economic health of western communities increasingly will depend on the health of the environment. Long-run prosperity will derive from efficient, effective efforts to conserve increasingly scarce environmental resources, protect high-quality natural environments, reverse past environmental degradation, and manage congestion in both urban areas and on public lands with high recreational use. Resource-management policies and economic-development activities that significantly compromise the environment will likely do more economic harm than good.

[91] Whitelaw, E. (editor). 2003. *A Letter from Economists to President Bush and the Governors of Eleven Western States Regarding the Economic Importance of the West's Natural Environment*. December 3. http://www.salmonandeconomy.org/pdf/120303letter.pdf (accessed December 8, 2005).

IV. NATURAL-RESOURCE AMENITIES AND ECONOMIC GROWTH IN NEBRASKA

The evidence we discuss above indicates amenities currently exert a strong influence over the prosperity of households and communities throughout the U.S.—affecting perhaps one-half of the variation in job growth from place to place—and this influence is likely to increase for the foreseeable future. The evidence we discuss below, however, indicates that, throughout most of Nebraska, this influence is either negative or less positive than it could be. Unless and until this state of affairs is reversed, the amenity-related elements of the state's economy will continue generating fewer jobs and lower incomes than they are capable of producing.

Nebraska's current performance indicates weakness in each of the four mechanisms by which natural-resource amenities can influence economic growth:

Mechanism 1 – Quality of Life: Many households are demonstrating, through their location decisions, that communities in Nebraska lack the quality of life they can find elsewhere. Although Nebraska lacks the climate and mountainous terrain that attract many households to other states, it does possess other resource-related attractions. For the most part, though, their potential to contribute to the state's economy has been overlooked or, worse, negated through actions that degrade environmental quality and/or restrict access.

Mechanism 2 – Feedback to the Farm Sector and Other Dominant Commercial Uses: Many of Nebraska's farm families could benefit economically from prudent efforts to enhance the state's natural-resource amenities. International trade negotiations and federal fiscal pressures raise the prospect of potential reductions in commodity-oriented farm subsidies in the foreseeable future, and heighten the importance of taking a candid look now at the potential for amenity-driven growth to strengthen income to the farm sector.

Mechanism 3 – Resource-Related Recreation Industry: Nebraska's overlooked, degraded, and inaccessible natural-resource amenities generate fewer recreation jobs than they are capable of producing.

Mechanism 4 – Environmental Values: Degradation of Nebraska's natural environment burdens the economy by undermining the values many people place on protecting the existence of species and special places and by reducing the environment's ability to provide valuable services.

In the remainder of this section we examine these conclusions in greater detail.

A. NATURAL-RESOURCE AMENITIES, QUALITY OF LIFE, AND NEBRASKA'S ECONOMY

If Nebraska's communities offered economic prospects more attractive than people can find elsewhere, then households would move into them and, once there, would remain. In many cases, though, they don't. Across most of the state, people are moving out. Moreover, the state as a whole is losing the people with the greatest potential for generating jobs and incomes. These trends signal serious underlying challenges in the state's economy. Many factors undoubtedly contribute to these challenges, and no single action will reverse them. It seems likely, however, that capitalizing on the state's natural-resource amenities is a necessary step.

Households Are Signaling Challenges for Nebraska's Economy

It doesn't take many conversations with Nebraskans to realize that most of them deeply love their state and its natural resources. Even many city residents identify strongly with the state's open spaces, small communities, and agricultural landscapes. For the most part, rural residents and residents of small towns place considerable value on their lifestyle and want to sustain it. Despite these preferences, however, many households are moving elsewhere, indicating that the preferences are overcome by conflicting realities.

Researchers have studied the state's population trends extensively, and a full synopsis of all their findings lies far outside the scope of this report.[92] Instead, we highlight a few studies to substantiate what we believe is a limited, but fair, interpretation of the literature: that major elements of these population trends signal serious current and potential economic challenges, not just for rural areas but for the cities and the state as a whole. Moreover, substantial research indicates that these population trends stem from the reverse of the amenity-driven-growth process. That is, much of the state the economy is stagnating or contracting due, in part, to the lack of amenities.

Between 2000 and 2004, only one county (Sarpy) experienced population growth that exceeded the national average.[93] Growth in four others

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[92] Besides the studies we cite below, *see*, for example, Cantrell. R. 2005. *Rural Depopulation: A Closer Look at Nebraska's Counties and Communities.* University of Nebraska Rural Initiative. September 19. http://ruralinitiative.nebraska.edu/?module=uploads&func=download&fileId=74 (accessed January 11, 2006). It offers a more sanguine view of demographic trends in some communities, but, in our view, does not overturn our general assessment.

[93] U.S. Department of Agriculture, Economic Research Service. 2005. "County-Level Population Data for Nebraska." June 16. http://www.ers.usda.gov/Data/Population/PopList.asp?ST=NE&LongName=Nebraska (accessed October 13, 2005).

(Washington, Cass, Lancaster, Hayes) was near the national average. Seventeen others experienced growth, but at rates significantly below the national average. All others experienced a loss of population. This is not just a recent phenomenon. In the 1990s, 53 of the state's 93 counties lost population.[94] Most of these (42) experienced net out-migration. In the others, net in-migration was positive, but not large enough to overcome the fact that deaths exceeded births by a larger number. The counties losing population generally have small populations to begin with, and lack proximity to urban areas. They incorporate large amounts of the state's territory, however.

Trends in population link to trends in jobs and incomes.[95] During the 1990s, for example, the rate of employment growth in the state's rural counties was just one-fifth the rate in its metropolitan areas. Per capita incomes in rural counties in 2000 were three-quarters those in metropolitan areas. Two of Nebraska's counties, Keya Paha and Loup, are among the nation's 20 poorest, and, more broadly, rural areas of Nebraska and other states in the northwestern Great Plains are now among the poorest parts of America.[96]

The economic consequences of losing population are made worse because Nebraska is systematically losing some of its most educated individuals. Figure 4 shows that, on balance, young people with higher levels of education are leaving Nebraska. For the 1995-2000 period, the state experienced a net loss of almost 4,500 young people with at least a bachelor's degree. The state may make up the loss if older groups of highly educated individuals move into the state. In general, though, Nebraska is either losing highly educated individuals in absolute numbers or failing to keep pace with the rest of the nation. Furthermore, this problem has been around for a long time. Between 1970 and 2000 the college-educated population of all but eleven of Nebraska's counties—Arthur, Buffalo, Cass, Douglas, Gosper, Hamilton, Holt, Lancaster, Sarpy, Saunders, and Wheeler—failed to keep up with the national average.[97]

Failing to attract and hold onto highly educated individuals deeply injures not just the state's economy today but also its outlook for tomorrow. On average, every time Nebraska loses someone with a professional degree who works full-time, it loses $110,000 in annual earnings; every time it loses someone with a newly minted professional

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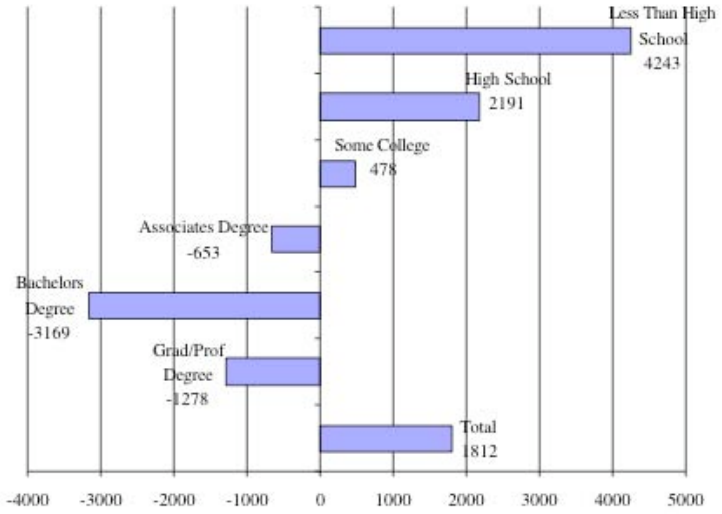
[94] Deichert, J. 2001. *Components of Population Change, Nebraska Counties: 1990-2000*. Center for Public Affairs Research, Nebraska State Data Center. 01-1. June.

[95] Bailey, J.M. and K. Preston. 2003. *Swept Away: Chronic Hardship and Fresh Promise on the Rural Great Plains*. Center for Rural Affairs. June.

[96] Anonymous. 2005. "Not Here, Surely? The Poorest Part of America." *Economist*. December 8, p. 31.

[97] Artz, G. 2003. "Rural Area Brain Drain: Is It a Reality?" *Choices* 4th Quarter: 11-15.

Figure 4. Estimated Net Migration into or out of Nebraska: 22-to-29-Year-Olds, by Level of Education, 1995-2000



Source: Nebraska Coordinating Commission for Postsecondary Education.2004. *2004 Baseline Report for LR 174 Higher Education Task Force: Challenges and Opportunities for Nebraska*. December 9.

degree, it loses lifetime earnings of $4.4 million.[98] Each loss has ripple effects, diminishing jobs and income for workers with less education. Such losses add up quickly. In a recent analysis, an economist with the Federal Reserve Bank of Kansas City concluded that, between 1985 and 1990, Nebraska lost about $246 million per year in personal income, or about 1.1 percent of the state's total, because of the so-called brain drain.[99] Those losses persist. Failure now to attract and hold onto highly educated individuals sharply raises the likelihood that Nebraska will experience sluggish economic growth in the future. Recent evidence indicates that cities starting with a higher concentration of college-educated individuals will experience faster growth in population and wages throughout the subsequent decade.[100]

The negative effects of losing highly educated workers and managers have materialized throughout Nebraska's economy, but especially in the

[98] Day, J.C. and E.C. Newburger. 2002. *The Big Payoff: Educational Attainment and Synthetic Estimates of Work-Life Earnings*. U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. July.

[99] Ferguson, D. 1995. "The Tenth District's Brain Drain: Who Left and What Did It Cost?" In *Regional Economic Digest*. First Quarter. Federal Reserve Bank of Kansas City. Pgs. 8-13.

[100] Wheeler, C.H. 2005. *Human Capital Growth in a Cross Section of U.S. Metropolitan Areas*. Federal Reserve Bank of St. Louis. Working Paper 2005-065A. September. http://research.stlouisfed.org/wp/2005/2005-065.pdf (accessed December 2, 2005).

manufacturing, finance, business-services, and health-services sectors.[101] Losing highly educated people in the service sectors is particularly worrisome, for these sectors are among the fastest growing nationally and a failure to keep pace with the rest of the nation now could snowball in the future. The state can hardly afford weakness in fast-growing industries. It has a high concentration of employment in two industries, agriculture and railroads, that some economists expect will lose jobs in the foreseeable future. Conversely it has below-average concentrations in industries expected to add jobs rapidly in the U.S. as a whole: employment services, management and technical consulting services, educational services, software publishers, and some health-care-related services.[102]

Nebraska, along with other states in the Great Plains, is losing not just workers but also households with incomes from investments. One researcher concluded: "[A]lthough the Plains region tends to have higher than average dependence on investment income, migration is pulling this highly mobile source of income away from the region, thereby resulting in a loss of valuable basic income for an already struggling region…."[103] He goes on to observe that, especially in nonmetropolitan parts of this region, households with high levels of investment income are moving out while households with low levels are moving in. As a consequence, "Because investment income represents a relatively large and growing share of total personal income and retirement income [in the nation as a whole], regions such as the Plains are left with concentrations of individuals and retirees with levels of resources which are lower overall."

Meeting the Challenges – The Potential Role of Natural-Resource Amenities

The evidence we present in this section indicates that, if it is to meet these economic challenges, Nebraska must significantly enhance the contribution to economic growth that is derived from the state's resource-related amenities. In making this statement we are not saying that amenity-driven growth will, by itself, overcome these challenges. It can't, for Nebraska's economic challenges stem from multiple sources. Instead, we are saying:

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[101] Ferguson, D. 1995. "The Tenth District's Brain Drain: Who Left and What Did It Cost?" In *Regional Economic Digest*. First Quarter. Federal Reserve Bank of Kansas City. Pgs. 8-13.

[102] Wilkerson, C. 2005. "What Do Expected Changes in U.S. Job Structure Mean for States and Workers in the Tenth District?" *Economic Review: Federal Reserve Bank of Kansas City*: 59-93.

[103] Nelson, P.B. 2005. "Migration and the Regional Redistribution of Nonearning Income in the United States: Metropolitan and Nonmetropolitan Perspectives from 1975 to 2000." *Environment and Planning A*. 37: 1613-1636.

- These economic challenges stem, in significant part, from the state's failure to provide natural-resource amenities competitive with those available elsewhere.
- Nebraska has significant resource-related amenities that, if managed appropriately, could make the state more attractive to households and generate amenity-driven growth.
- The economic forces underlying amenity-driven growth affect the potential effectiveness of economic-development strategies that receive a lot of attention. Strategies that do not protect, enhance, and capitalize on the state's natural-resource amenities are likely to worsen, not solve, the state's economic challenges.

The following discussion substantiates each of these statements.

These economic challenges stem, in significant part, from the state's failure to provide natural-resource amenities competitive with those available elsewhere. As we show above, research conducted throughout the U.S. indicates natural-resource amenities exert a powerful influence over the location decisions of many households, especially those of highly educated individuals, and household-location decisions account for about one-half of interstate differences in the growth of jobs. Nebraska lacks the ability to provide some of the amenities with a demonstrated impact on households: climate and mountainous terrain. Hence, it comes as no surprise that people are leaving communities throughout rural Nebraska or that more highly-educated young people move out of the state than move in.

Nebraska has resource-related amenities that, if managed appropriately, could make the state more attractive to households. Research on amenity-driven growth has identified amenities other than climate and mountainous terrain that influence household-location decisions. These include water resources, large open spaces, opportunities for watching birds and other wildlife, and landscapes associated with the nation's cultural heritage. Nebraska has lots of each. Many Nebraskans recognize these amenities and consider them important. Graph A in Figure 5, for example, shows that one-half or more of the Nebraskans responding to a 2003 survey indicated clean water, rivers and streams, lakes and reservoirs, state parks, and natural areas are very important. Graph B shows that nearly all Nebraskans responding to the survey considered farming important or very important to their quality of life. In "The Cornhusker State" this is not surprising. Almost one-half of the respondents considered observing wildlife very important, and more than half considered all the resource-related recreational activities in the list as either very important or somewhat important. Graph C shows that about one-quarter consider proximity of fishing and hunting opportunities to be very important when making household-location decisions.

The final two graphs in Figure 5 provide insights into Nebraskans' perceptions of the economic importance of natural-resource amenities.

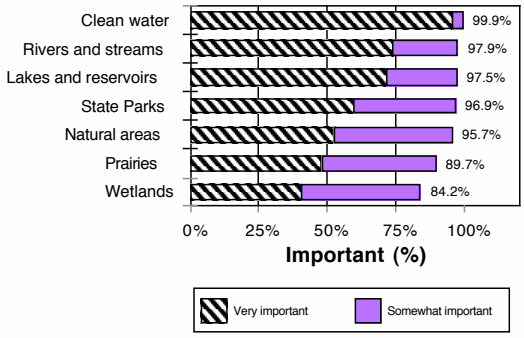
Graph D shows that more than one-half of Nebraskans believe healthy fish and wildlife populations are very important to the state's economy and the well-being of its residents, and another 37 percent believe they are somewhat important. Although the survey did not probe the underlying reasoning, these responses suggest that many Nebraskans believe the state must have a healthy natural environment if its economy is to be healthy and if they are to have a high standard of living.

The final graph in Figure 5 sheds light on the magnitude of the economic value Nebraskans place on the state's fish and wildlife resources. About 55 percent of the respondents said their annual income would have to increase by some amount for them to move someplace with less abundant fish and wildlife, and 40 percent said they would require at least a 10 percent increase.

Figure 5. Nebraskans' Views on the State's Amenities

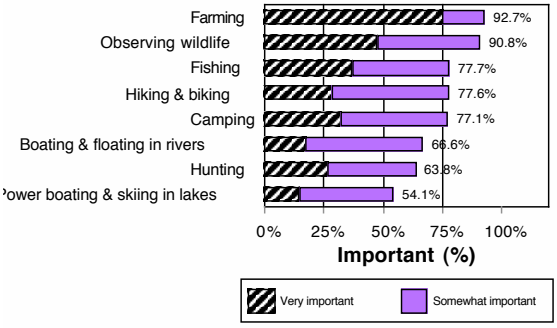
A.

How important are the following resources to your quality of life (health, family, well-being, environment, community) in Nebraska?



B.

How important are the following activities to your quality of life (health, family, well-being, environment, community) in Nebraska?



The graphs in Figure 5 reaffirm the findings of the research conducted elsewhere regarding the economic importance of natural-resource amenities and their contribution to quality of life. Most Nebraskans apparently care a lot about the quality-of-life benefits they derive not just from the state's fish and wildlife populations but also from its water resources, natural areas, prairies, and wetlands. Even though most Nebraskans place a considerable value on living amid the state's natural-resource amenities, these amenities are not sufficient to offset the movement of people from most rural areas and the out-migration of highly-educated individuals from the state as a whole.

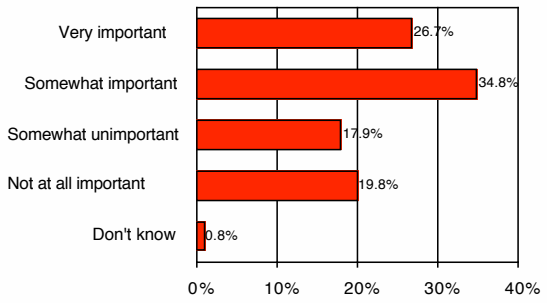
These findings are only the tip of the iceberg, however, in terms of acquiring a full understanding of Nebraskans' perceptions of the relationship between the state's natural resources and its economy. More than one-half (56 percent) of the Nebraskans responding to a subsequent survey said they believed environmental protection is more important than economic development, and 73 percent said environmental protection and economic development can

continued

Figure 5, cont. Nebraskans' Views on the State's Amenities

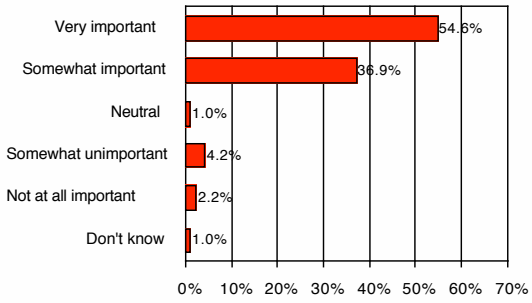
C.

When choosing a location to live, how important is having nearby fish and wildlife resources in making that decision?



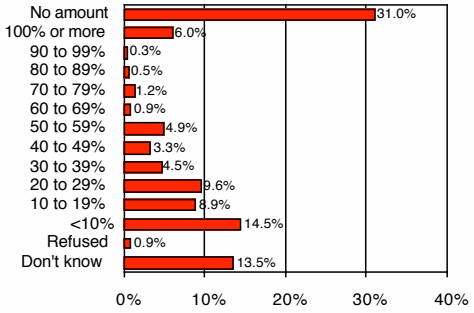
D.

How important do you think healthy fish and wildlife populations are to the economy of Nebraska and the well-being of its residents?



E.

How much more in annual income would it take for you to move to a place where fish and wildlife resources were less abundant than where you currently live?



go hand-in-hand.[104] And nearly 90 percent of the respondents agreed that environmental conditions will play a role in the nation's economic future. These findings buttress the conclusion that most Nebraskans see the economic importance of a healthy environment and, more than other Americans, believe economic development and environmental protection can occur concurrently.

That Nebraskans place considerable value on the state's amenities comes as no surprise. A landmark, 1991 study of the effects of amenities on interstate differences in labor markets found that, overall, Nebraskans were willing to forgo higher earnings they could receive elsewhere to enjoy the amenities of living in Nebraska (natural-resource amenities and others).[105] The authors concluded that the incremental economic value of the state's amenities, compared to the average amenities of all states, equaled about 1.2 percent of Nebraskans' earnings, i.e., about 1.2 percent of their first paychecks.

This finding can yield a rough estimate of the second paycheck Nebraskans enjoy by living here. Total annual earnings in Nebraska are about $10 billion. If the findings of the 1991 study still apply, then the annual second paycheck associated with the state's amenities are 1.2 percent of total earnings, or ($10 billion x 1.2 percent =) $102 million. The fact that so many highly-educated individuals are leaving the state, however, indicates the allure of Nebraska's amenities has declined since 1991, the allure of amenities elsewhere has risen, or both.

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[104] Nebraska Alliance for Conservation and Environment Education. 2005. *Nebraska Conservation and Environment Literacy and Awareness Survey: Executive Summary*. http://www.nacee.org/ (accessed December 27, 2005).

[105] Greenwood, M.J., G.L. Hunt, D.S. Rickman, and G.I. Treyz. 1991. "Migration, Regional Equilibrium, and the Estimation of Compensating Differentials." *The American Economic Review* 81 (5): 1382-1390.

Further research is needed to sort through the possibilities.

Despite this ambiguity, there is clear evidence that Nebraska possesses extensive natural resources with substantial amenity value. The discussion below, however, indicates this value is markedly less than it could be.

Nebraskans are not managing the state's natural resources to capitalize fully on the potential amenity value. For the state's natural resources to influence household-location decisions positively (from Nebraska's perspective), two conditions must be satisfied. One, people must place a high value on using the resources. Two, people must see that, by living in Nebraska, they will have easier and cheaper access to the resources than if they lived elsewhere. Nebraska widely fails to satisfy either condition. Although Nebraskans broadly recognize the economic importance of living in the state so they have ready access to healthy fish, wildlife and other resources, many of these resources are degraded, poorly accessible, or both.

Rivers throughout the state, for example, have been diverted, channelized, polluted, and reduced to a trickle, if not pumped dry. Analysis of water samples taken in 1998 from streams and reservoir outflows in Nebraska (and other states in the Great Plains) found that most samples contained more than 10 different herbicides or substances derived from the transformation of herbicides, once they have been applied. More than 50 percent of the samples contained more than 14 herbicides or related products.[106]

Similar news is common. A 1998 study by the U.S. Geological Service, for example, found that ground water in the central Platte River Basin, when compared with test sites in other states, ranks in the top 25 percent in concentrations of pesticides, nutrients, and dissolved solids.[107] The authors concluded samples of ground water from the shallow aquifer associated with the Platte River, below its confluence with the Elkhorn River, contained pesticides at levels that probably exceeded drinking-water standards. This aquifer is the principal source of water for the state's major municipalities. One of three samples of tissue taken from fish near Louisville contained pesticides at levels above standards deemed safe for fish-eating wildlife. Withdrawals of water and other factors have reduced the width of the Platte River's channel by as much as 90 percent near North Platte and 40 – 60 percent near Grand Island. These and similar indicators can persuade households seeking a clean, healthy natural environment to live elsewhere.

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[106] Battaglin, W., E.M. Thurman, S.J. Kalkhoff, and S.D. Porter. 2003. "Herbicides, and Transformation Products in Surface Waters of the Midwestern United States." *Journal of the American Water Resources Association* 39: 743-756.

[107] Frenzel, S.A., R.B. Swanson, T.L. Huntzinger, J.K. Stamer, P.J. Emmons, and R.B. Zelt. 1998. *Water Quality in the Central Nebraska Basins, Nebraska, 1992-95*. U.S. Geological Survey. Circular 1163.

The economic impacts on households also might be persuasive. By one estimate, the pesticides that are applied in the state's production of crops and livestock but end up in drinking-water supplies impose costs on households that equal more than nine percent of the total value of the state's agricultural production.[108] For the period, 1960-96, the authors of this study concluded Nebraska ranked fifth among the states in pollution costs from agricultural pesticide use.

The ecosystem of the Missouri River Basin, including those portions in Nebraska, also has been severely modified, so that it no longer is able to produce valuable goods and services, including those many people consider economic amenities because it has been altered so extensively:[109]

- The Missouri River Basin as a whole has lost almost 3 million acres of natural riverine and floodplain habitat, with native plant communities inundated by reservoirs or converted to cropland. Much of this loss has occurred in Nebraska or upriver so that it affects Nebraska.
- The amount of sediment transported down the river, which is critical to the river's form and functions, has diminished more than 97 percent in some reaches as the river passes parts of Nebraska.
- The river's natural peak flows have diminished sharply, curtailing those elements of the ecosystem that depend on them. The diminution of peak flows has, for example, largely terminated the reproduction of cottonwood trees, once the floodplain's most abundant and ecologically important species.
- Populations of invertebrate species important to the river's food web have fallen about 70 percent.
- Modification of the Missouri River, largely to serve the barge industry, has negatively affected river-related recreation. One analysis, building on a 1981 estimate that almost 400,000 days of recreational activity are lost annually, concluded that this loss now depresses trip-related expenditures associated with the river by more than $16 million.[110]
- More than three-quarters (51 of 67) of the native fish species in the mainstem portions of the river are now listed as rare, uncommon, and/or decreasing across all or part of their ranges.

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[108] Fare,R., S. Grosskopf, and W.L. Weber. 2006. "Shadow Prices and Pollution Costs in U.S. Agriculture." *Ecological Economics*. January. 89-103. Earlier studies report lower costs from agricultural pollution. *See*, for example, Ribaudo, M.O., R.D. Horan, and M.E. Smith. 1999. *Economics of Water Quality Protection from Nonpoint Sources: Theory and Practice*. Resource Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 782. November.

[109] National Research Council, Committee on Missouri River Ecosystem Science. 2002. *The Missouri River Ecosystem: Exploring the Prospects for Recovery*. Washington, D.C.: National Academy Press.

[110] Mestl, G. and E. Zuerlein. 2004. *Missouri River Navigation*. 8th Annual Missouri River Natural Resources Conference: Columbia, Missouri. May 23-26.

These are but a few of the published reports that give the perception Nebraska has pervasive environmental problems. Further research must be completed to know for sure, but it seems safe to anticipate that the perception, if not the reality, of pervasive pollution and environmental degradation in Nebraska influences some people to live elsewhere. Reversing this effect may require both site-specific improvements in environmental quality as well as improvements across larger areas involving more than one type of resource.

Another factor influencing some to locate elsewhere may be the limited access to the state's resource-related amenities. Until recently, for example, Omaha's waterfront along the Missouri River was occupied by industrial uses and the legacy of hazardous wastes. Thus, the city was long deprived of the amenities that were revealed when the urban waterfront was made accessible to the public. It is no accident that rapid development has accompanied greater access to the waterfront. Many other cities—from Boston to Boise—have had a similar experience.

Elsewhere in the state, however, substantial barriers to access remain. Many materialize because about 97 percent of the state's land is privately owned. Private ownership has many virtues, but it generally produces a situation where a landowner has little interest in providing the public with access to amenities on his/her land. Farmers, for example, may not want the bother, the disruption of farm operations, or the potential liability that may arise by giving people access to streamside areas attractive for fishing or hiking. Many landowners apparently don't want these problems. Scrolling through websites, such as the one operated by the Game and Parks Commission, that list outdoor recreational opportunities reveals many qualifiers, such as "Private access, permission required."[111]

Even where amenities are in public ownership, access may be limited in indirect ways. Many publicly owned sites lie distant from population centers or from major highways, which may deter some potential visitors (but attract others). Many parts of the state have limited support infrastructure, such as visitor centers, restaurants, and motels, that may be necessary to attract visitors. The Nebraska Game and Parks Commission summarized the overall absence of good access to the state's natural-resource amenities this way, recognizing that some of the barriers to access keep people from even seeing the amenities and their value:

> Most travelers come through Nebraska via Interstate 80 and see it as a vast, flat, agricultural state. They don't see Nebraska's rolling hills, winding rivers, pine forests and native prairies full of wildlife. Visitors must become aware of Nebraska's natural and cultural resources for the continued health of the state's

[111] To address some of these concerns and to provide an incentive for landowners to allow recreationists onto their lands, the legislature adopted the Recreation Liability Act (1998), which limits landowners' liability for injuries recreationists incur.

> tourism industry. If these resources are ignored, our tourism industry and the quality of life of residents will be affected.[112]

We make these observations not to criticize, in any way, the owners, private or public, of land and water resources who limit access to them. Instead, we point out a reality: many of the natural resources that might help the state attract and hold onto the people who would enjoy these resources for their amenity value are not accessible. If there is a road or trail to them, they sit behind locked gates, or, there may be no road or trail to them at all. These restrictions on access limit the ability of these resources to contribute to the quality of life of those who do not own them, i.e., the vast majority of Nebraskans.

Some amenities, such as mountains and ocean beaches, might be so rare and dramatic they can influence household-location decisions even when somewhat trampled and hard to reach. Nebraska, though, doesn't have this luxury. It is not alone in having water resources, open spaces, birding opportunities, cultural heritage sites, and so on. Hence, it faces the challenge of distinguishing itself from the crowd, and it can do this only if its amenities are better than those of its neighbor states. Better, in this case, means having a higher quality and being more accessible. Many of the state's resources with potentially high amenity value, however, have been seriously degraded. Those natural resources with above-average amenity value are often difficult to access, if they are accessible at all.

As long as these conditions persist, Nebraskans should anticipate that resource-related, amenity-driven growth will occur elsewhere. If they want to pursue this type of growth, they must ensure that residents and visitors can readily identify and enjoy high-quality amenities.

The forces underlying amenity-driven growth affect the potential effectiveness of economic-development strategies. How Nebraskans manage their state's natural-resource amenities affects the state's economy directly, by stimulating or impeding the process known as amenity-driven growth. It also affects the effectiveness of economic-development strategies that receive a lot of attention.

One of the major economic-development strategies entails investing in education, building a world-class pool of highly productive workers. This alternative will not be successful, however, if these same highly-educated workers continue current trends and choose to live someplace else.

Another strategy entails relaxing environmental regulations for some industries. This strategy, though, might increase the costs other industries and households incur to cope with environmental degradation and reinforce the perceptions that encourage some highly productive households to locate elsewhere.

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[112] Nebraska Game and Parks Commission. 2005. *State Comprehensive Outdoor Recreation Plan (SCORP): Assessment and Policy Plan 2006-2010 Draft,* p. 96.

A third strategy entails devoting even more of the state's natural resources to agricultural production. Greater production may generate enough new jobs and income to boost the state's overall economy, but not necessarily. The agricultural industry has long exhibited a downward trend in its ability to generate new jobs and most farm families currently do not earn enough farm income to support themselves. Moreover, most growth in jobs and incomes materializes in and near urban centers. Nebraska's success in attracting productive workers to its urban centers will depend to a great extent on its ability to provide them with amenities sufficiently attractive to persuade them to locate here rather than elsewhere. Efforts to expand Nebraska's agricultural sector may have an adverse impact on the state's ability to attract highly-educated workers and their families, and to stimulate growth in rapidly-expanding industries. For the nation as a whole, research indicates that the population of highly-educated individuals has been growing most slowly, or even declining, in areas with a greater concentration of employment in resource-intensive industries: agriculture, mining, and manufacturing.[113]

In making this assessment, we distinguish between the agricultural industry's overall size and its ability to induce growth. There can be no doubt about the industry's dominance in many dimensions of the state's economy: land value, expenditures, etc. This dominance, though, does not automatically give the industry an ability to generate enough new jobs and incomes to boost the overall economy. Certainly, this conclusion applies to those elements of the farm sector that would not exist without subsidies, but it also applies to those that do not depend so heavily on subsidies. At the end of the last decade, for example, the Panhandle Region of the state, with its concentration in livestock production generated $4 billion in annual sales and $1.8 billion in personal income.[114] Despite these numbers, or perhaps because of them, the region's economy lacks diversity, it lost about 15 percent of its population in the last half of the twentieth century, and it has a higher incidence of low-income families than the state as a whole. These and similar trends cannot be reversed by allocating more of the state's resources to current agricultural production practices. If the state's natural resources are to help reverse these trends, they must be allocated differently to capitalize more extensively on opportunities for amenity-driven growth.

A fourth economic-development alternative involves enticing new firms and industries to Nebraska. Such an approach has many attractions. Most new firms and industries, however, have a wide variety of locations to choose from, and what would entice them to choose Nebraska? In most

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[113] Walser, J. and J. Anderlik. 2005. *FDIC Banking Review; The Future of Banking in America; Rural Depopulation: What Does It Mean for the Future Economic Health of Rural Areas and the Community Banks That Support Them?* February 11. http://www.fdic.gov/bank/analytical/banking/2005jan/article2.html (accessed October 14, 2005).

[114] Macke, D. 1999. *Socio-Economic Analysis of the Panhandle Region of Nebraska: Draft Report*. Nebraska Rural Development Commission. June 15.

cases, firms make location decisions taking into account a long list of factors. Often, high on the list are the firm managers' concerns about the quality of life and the productivity of workers. Some firms certainly overlook these factors and choose to locate in areas with a low quality of life and a large supply of workers with low levels of education and productivity. Too great an emphasis on enticing such firms to the state, however, could further injure its ability to generate high-paying jobs.

A fifth alternative has a more home-grown character. It focuses on cultivating entrepreneurs who initiate new firms, generate new jobs, and create new incomes. Entrepreneurs, however, tend to concentrate in places where the quality of life is high. The success of this alternative, therefore, appears to be linked to the state's success in protecting, enhancing, and capitalizing on the state's natural-resource amenities. Failure to do so could restrict the state's ability to attract a broad population of entrepreneurs.

There are undoubtedly other economic-development alternatives available to Nebraska and its communities, but these are the ones that receive the most attention. The potential success of each is influenced by the state's ability to protect, enhance, and capitalize on the state's natural-resource amenities. This is not to say that other factors are not important—the growth also depends on good schools, safe communities, and other things. It does, though, strongly suggest that efforts to improve the attractiveness of natural-resource amenities must be at or near center stage, if Nebraska is to address the economic challenges we describe above. There is, of course, no guarantee of success. Improving these amenities may not be sufficient to overcome these challenges. At the moment, though, it seems a safe bet that the longer Nebraskans delay taking meaningful, substantive steps to improve the quality of and access to its natural-resource amenities, the more entrenched these challenges will become, and the harder they will be to reverse.

Recent research, which we mention above, drives home this point. The researchers looked at the influence "nice places" exert on the economies of the 90 largest metropolitan areas in the U.S., including Omaha.[115] For the purposes of their study, they used a limited definition of "nice places:" national parks, lakeshores, seashores, and recreation areas. Their results demonstrate that households in metropolitan areas enjoy a second paycheck from proximity to one or more of these "nice places." The closer the nearest "nice place," the larger the second paycheck, and the impact can be significant. For the average metropolitan area, having a "nice place" one hundred miles closer would increase the second paycheck by about 4 percent of the area's average first paycheck, all else equal. The data used in the study also show that, of the 90 largest metropolitan areas, Omaha is the furthest from a "nice place". Thus, among the 90

[115] Schmidt, L. and P.N. Courant. Forthcoming. "Sometimes Close Is Good Enough: The Value of Nearby Environmental Amenities." *Journal of Regional Science.*

metropolitan areas, households living in Omaha enjoy the smallest second paycheck from proximity of a "nice place." This information suggests that the amenity-driven-growth process in Omaha could receive a considerable boost if a new national park or recreation area, such as a new "Missouri River National Park," were to be created nearby.

Another study, focused on Nebraska and its neighbors in the Farm Belt, reinforces the conclusion that amenities play an important economic role in this region.[116] It examined economic growth between 1990 and 2001 in the 734 counties of Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, South Dakota, and Wisconsin. Its purpose was to determine the extent to which differences in a large set of economic characteristics correlate with differences in the growth in total county income, population, and per capita income. The authors included two indicators of natural-resource amenities: swimming areas at facilities operated by the U.S. Army Corps of Engineers; and an index of outdoor recreation amenities that includes rails-to-trails miles, acres of recreational land in the National Resources Inventory, acres of recreational water in the National Resources Inventory, and comparable data on the amenities of state parks.

The authors found that, for a representative county, increasing the value of the amenity index by one standard deviation (a standardized measure) would increase per capita income by $270. Increasing the number of swimming areas by a comparable amount would increase per capita income by $187. By comparison, a comparable increase in the share of total county income from farming would decrease per capita county income by $1,410, and a comparable increase in the growth in livestock receipts would increase per capita income by $47. Based on these and related findings, the authors concluded that, for this region:

> Recreational amenities, both those created locally and those provided by the federal government, have a positive and statistically significant impact on county economic growth. We hypothesize that this occurs because local recreational amenities provide incentives to employers to site plants and businesses near such amenities to attract employees and their families who make residence location decisions based in part on proximity to these amenities. Further, we anticipate that recreational amenities will play an even more important role in the future as demand for outdoor recreation grows with growing incomes, leisure time, and population.

This evidence highlights the potential for natural-resource amenities, especially those in public ownership, to contribute to the economies of this region. The studies strongly suggest that enhancing the amenities available to the public on publicly owned lands in Nebraska would stimulate amenity-driven growth in the state. These studies do not, however, specifically address the potential role of privately owned lands.

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[116] Monchuk, D.C., J.A. Miranowski, D.J. Hayes, and B.A. Babcock. 2005. *An Analysis of Regional Economic Growth in the U.S. Midwest*. Working Paper 05-WP-392. Center for Agricultural and Rural Development, Iowa State University. April. http://www.econ.iastate.edu/research/webpapers/paper_12294.pdf (accessed April 26, 2006).

This potential is especially important in Nebraska, insofar as nearly all land in the state is privately owned.

Private lands in Nebraska already contribute to amenity-driven growth to some extent: some farm and ranch landscapes provide scenery attractive to nearby residents or visitors; some landowners make their lands available to hunters; others provide habitat for birds and other wildlife; and some farms and ranches have initiated agritourism enterprises, for example. Additional contributions from private lands might be realized through the decisions of individual landowners. A farmer or rancher might opt to seek additional revenues by diversifying operations to include agritourism, for example, or by engaging in resource-conservation activities that qualify for payments under the Conservation Reserve Program.

Additional contributions from private lands also might materialize through collaborative efforts among landowners or between landowners and public entities. Collaborative efforts may be necessary because an amenity spans several properties or because joint efforts might accomplish things beyond the reach of an individual. Neighboring landowners operating bed-and-breakfast operations in the Sandhills, for example, might join forces to establish a visitors center that publicizes the area, serves as a focal point for visitors, and boosts the landowners' sales of hospitality and other products. Similar efforts might stimulate sales associated with other amenities, such as the Missouri and Platte Rivers or the annual migration of cranes in the Central Flyway. As landowners develop amenity-oriented enterprises, governments might coordinate with them to rework roads, schools, and other public services to meet the demands of an amenity-oriented service industry.

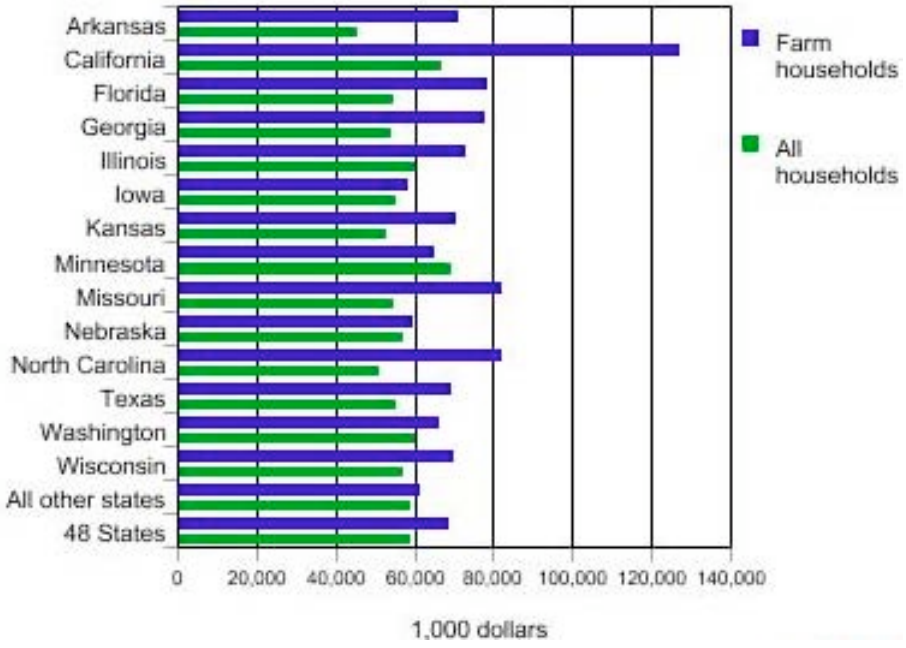
Nebraskans cannot reasonably expect private landowners to provide amenities without limit. Landowners have financial incentives to provide amenities they can sell to the public, such as hunting rights and agritourism activities. They don't, however, have direct economic incentives to provide other amenities, the benefits of which are enjoyed by others. For example, they have no direct incentives to provide pleasant landscapes for passersby to see as they drive along the state's highways, fishing opportunities for anglers downstream, or free viewing opportunities for birdwatchers. This disconnect between the landowners who bear the costs of providing such amenities and the members of the public who enjoy the benefits has serious implications. Such amenities can be especially important for the overall economy, insofar as the benefits from them can be enjoyed by, and increase consumer's surplus for thousands of individuals. Many of these amenities have been available for public benefit in the past due to particular circumstances or the good will of individual landowners. There is no assurance that landowners will provide these amenities in the future, however. Securing and expanding their availability in the future may require additional measures, such as financial-incentive programs, so that both landowners and the public realize economic benefits from the amenities.

B. NEBRASKA'S NATURAL-RESOURCE AMENITIES AND THE FARM SECTOR

Increased production of amenities may yield financial benefits to many of Nebraska's farms and ranches. Some may be able to diversify and increase their earnings by initiating amenity-oriented enterprises, such as agritourism, or by participating in the Conservation Reserve Program or similar programs. Others may be able to cut their costs and increase their net earnings by expanding their conservation efforts. Many farm and ranch families in Nebraska depend heavily on off-farm sources of income to maintain their standard of living. At least some of these may realize benefits if amenity-driven growth strengthens local economies and generates additional opportunities for family members to earn off-farm income.

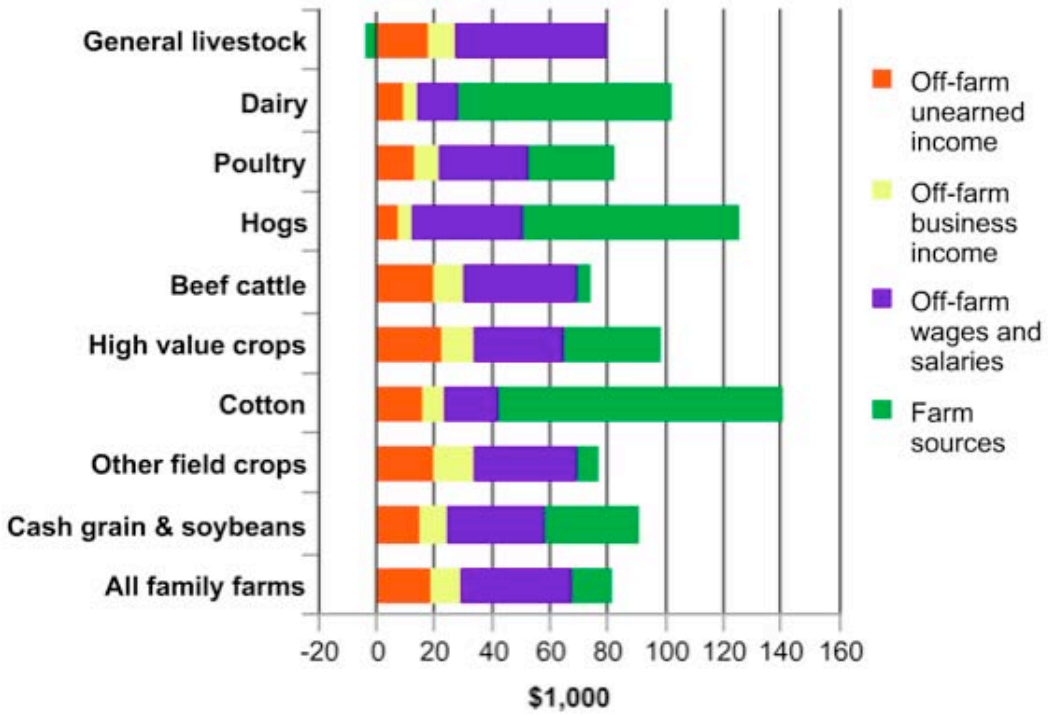
Figures 6 and 7 illustrate the extent to which a stronger off-farm economy might aid the state's farm families. Figure 6 shows that farmers in Nebraska, on average, earn less than their counterparts in other states, with the exception of Iowa, both in absolute terms and in their position relative to non-farm households. Figure 7 uses national data to show the importance of off-farm income for farm families producing different types of commodities. "General livestock" producers experienced a loss in their

Figure 6. Average Farm Household Income Compared to All Households in State, 2003



Source: U.S. Department of Agriculture, Economic Research Service. 2005. "Farm Household Economic and Well-Being: Farm Household Income." November 3. http://www.ers.usda.gov/Briefing/WellBeing/farmhouseincome.htm (accessed December 28, 2005).

Figure 7. Average Household Income, by Source and by Farm Commodity Specialization Type, 2004



Source: U.S. Department of Agriculture, Economic Research Service. 2005. "Farm Household Economic and Well-Being: Farm Household Income." November 3. http://www.ers.usda.gov/Briefing/WellBeing/farmhouseincome.htm (accessed December 28, 2005).

farm operations in 2004, and relied entirely on off-farm sources for their net income. Producers of "Beef cattle" earned about 90 percent of their net income from off-farm sources, and off-farm sources contributed about two-thirds of net income for producers of "Cash grain and soybeans." Combined, the data in these two figures reinforce the notion that, if Nebraskans want to sustain and strengthen the state's farm sector, they must look outside it and make certain farm and ranch families have access to jobs and incomes in non-farm activities.

This conclusion is reinforced if one considers the possibility that farm subsidies might diminish in the foreseeable future, in response to the World Trade Organization and federal fiscal problems. We make no predictions about the nature or timing of potential reductions in subsidies, or even about the probability that any reductions will occur. If they do occur, though, farm families in Nebraska are likely to be among those most affected. Researchers at the Federal Deposit Insurance Corporation, the entity that insures bank deposits, recently looked at this

Figure 8. Counties Likely to Incur the Greatest Impact from a Decline in Farm Subsidies

Source: Federal Deposit Insurance Corporation. 2005. "What Does the Future Hold for U.S. Agricultural Subsidies?" *FDIC Outlook*. Fall. http://www.fdic.gov/bank/analytical/regional/ro20053q/na/2005fall_04.html (accessed December 5, 2005).

issue.[117] They concluded that not all rural areas would be affected the same way: those with the greatest concentrations of farms receiving subsidies would experience the greatest overall economic decline; those with the strongest non-farm sectors, natural-resource amenities, and proximity to population centers would fare the best. Figure 8 summarizes their findings, identifying the counties the authors conclude are most likely to experience marked economic declines in response to a significant decline in farm subsidies. The counties highlighted on the map, including most counties in Nebraska, have the greatest dependence on subsidies and, because they lack economic diversity, natural-resource amenities, and proximity to population centers, they have the fewest economic options for adjusting to a decline in subsidies.

Efficient efforts to strengthen the amenity values of the state's natural resources might offset the potential effects of reduced farm-commodity subsidies by strengthening the off-farm sectors of the state's economy. The offset might occur in two ways: by increasing farm revenues and decreasing farm costs. Increases in farm revenues can occur as farms sell amenities in addition to commodities. Some landowners, for example, rent opportunities for hunting, fishing, and watching wildlife. As a rule-of-thumb, lease earnings for hunting in Nebraska are generally enough to pay real-estate taxes, about $2,400 per landowner on average.[118] Earnings for fishing tend to be significantly lower, and leases for bird-watching and other so-called eco-tourism activities are relatively new, but growing.

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[117] Federal Deposit Insurance Corporation. 2005. "What Does the Future Hold for U.S. Agricultural Subsidies?" *FDIC Outlook*. Fall. http://www.fdic.gov/bank/analytical/regional/ro20053q/na/2005fall_04.html (accessed December 5, 2005).

[118] Personal Communication, David Nelson, Vice President for Conservation and Recreation Services, Farmers National Company. January 27, 2006.

More generally, efforts are underway to strengthen the impact of natural-resource amenities on farm incomes. The Nebraska Department of Travel and Tourism, for example, has initiated a program to compile and disseminate information to farmers considering the development of agritourism enterprises.[119] The division's web site lists over 300 agritourism sites across the state.[120]

An economic study of Lake McConaughy, which we discuss above, raises another possibility: deferring irrigation, in exchange for compensation, so that more water would be available for recreational activities. The study found that, when the reservoir is low, at 20 percent of capacity, adding 100,000 acre-feet would increase the total recreation value by $1.4 million per year. Under those circumstances, the average recreational value of additional water at Lake McConaughy is about $14 per acre-foot.[121] In contrast, other researchers found that some water used for irrigation upstream of the reservoir, especially spring runoff used for the first cutting of alfalfa, has a lower value, perhaps as low as $9 per acre-foot.[122] The difference in value indicates there may be opportunities for some farmers to increase their net earnings sometimes by diverting water from the production of commodities to the production of recreational amenities.

Some farmers also might be able to increase net earnings by curtailing some farm practices harmful to the environment. We discuss, above, some of the research that demonstrates such opportunities. Figure 9 reinforces this point, showing the extent to which current farm practices diminish the productivity of farm soils through erosion. Some of the greatest losses, more than $1,000 per acre per year, occur in Nebraska. In addition, soil erosion causes economic damage downwind or downstream.

Many farms and ranches have already adopted technologies, such as pivot sprinklers, and agricultural practices, such as no-till cultivation, that conserve resources. More conservation may be possible, however, as indicated by research in Nebraska, which confirms that farmers sometimes can reduce negative environmental impacts with little or no negative effect on net earnings. Studies in the Republican River Basin since 1996 have examined the impacts of alternative irrigation strategies on farmers' profits. The researchers have found "there is good potential for reducing irrigation water one or more inches per acre with little or no

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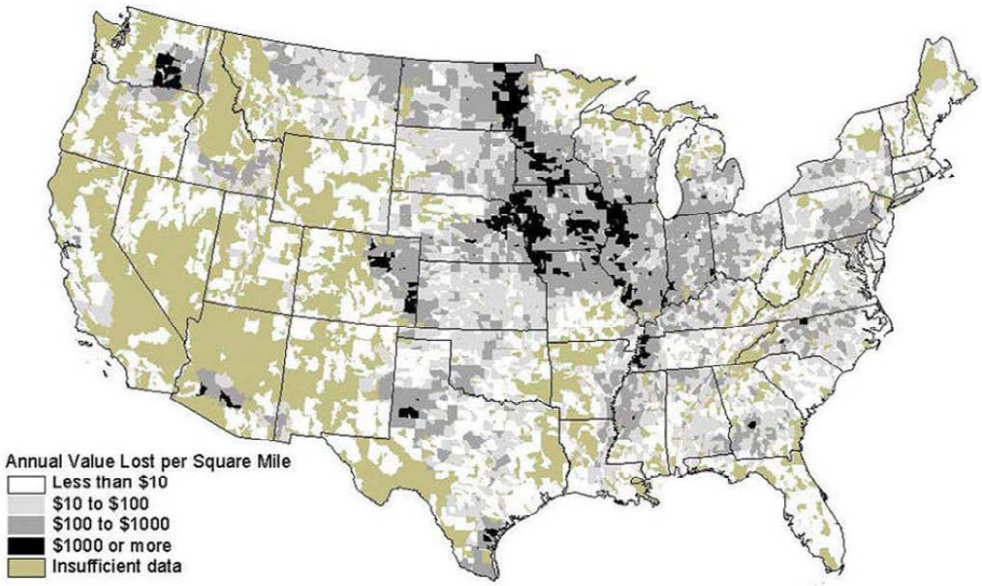
[119] *See*, for example, the division's recent publication, *Nebraska's Guide to Agri-Tourism and Eco-Tourism Development: A Handbook for Developing and Agri/Eco-Tourism Business*.

[120] Nebraska Division of Travel and Tourism, Department of Economic Development. http://ruralinitiative.nebraska.edu/weblinks/redirect/374.

[121] Supalla, R.J. 2005. *Economics of Management Options for Lake McConaughy: Executive Summary*. University of Nebraska – Lincoln, Department of Agricultural Economics. December 13.

[122] Houck, E., G. Taylor, and M. Frasier. 2000. *Valuing the Characteristics of Irrigation in the Platte River Basin*. Western Agricultural Economics Association, Vancouver, British Columbia. June 29-July 1.

Figure 9. Annual Value of Soil Lost to Erosion



Source: Magleby, R. 2003. "Soil Management and Conservation." In *Agricultural Resources and Environmental Indicators, 2003*. Edited by R. Heimlich. U. S. Department of Agriculture, Economic Research Service. http://www.ers.usda.gov/publications/arei/ah722/arei4_2/AREI4_2soilmgmt.pdf (accessed December 2, 2005).

decrease in net revenue."[123] Research by the Upper Big Blue Natural Resources District extends this conclusion.[124] It found that applying 10.8 inches of irrigation water to corn, instead of the more common 14.8 inches, increased the crop slightly and lowered irrigation costs $24 per acre. Additional savings could result from managing fertilizer more carefully. For a farmer with 500 acres of corn, the total savings are about $23,600. Additional benefits could materialize insofar as curtailing excessive irrigation and use of fertilizer can reduce the quantities of nutrients that end up in surface and ground water.

Other research looked at the economic consequences in the Republican River Basin of potential restrictions on water use because of drought or a recent decision limiting Nebraska's right to consume water that otherwise would go to Kansas. The analysis indicated that reducing pumping of groundwater by 10 percent would reduce the basin's total economic output by about one percent.[125]

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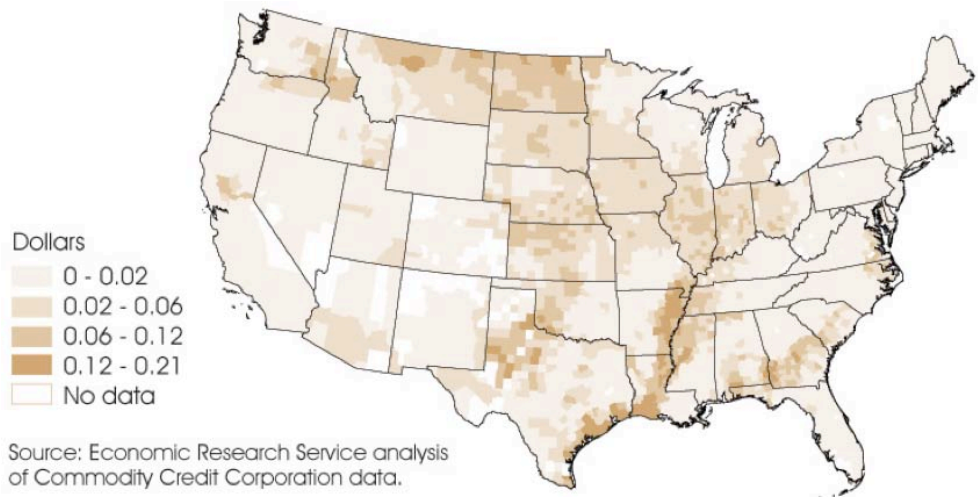
[123] Schneekloth, J.P., N.A., Norton, and R.T. Clark. 2001. "Limited Irrigation Management Strategies: Yield and Net Return Implications." *Focus: Economic Issues for Nebraskans.* Fall, p. 31.

[124] Hovey, A. 2006. "Crops Can Do Well with Limited Irrigation." *Lincoln Journal Star*. January 1. http://www.journalstar.com/articles/2006/01/01/local/doc43b724b2edca9598541681.txt (accessed January 3, 2006).

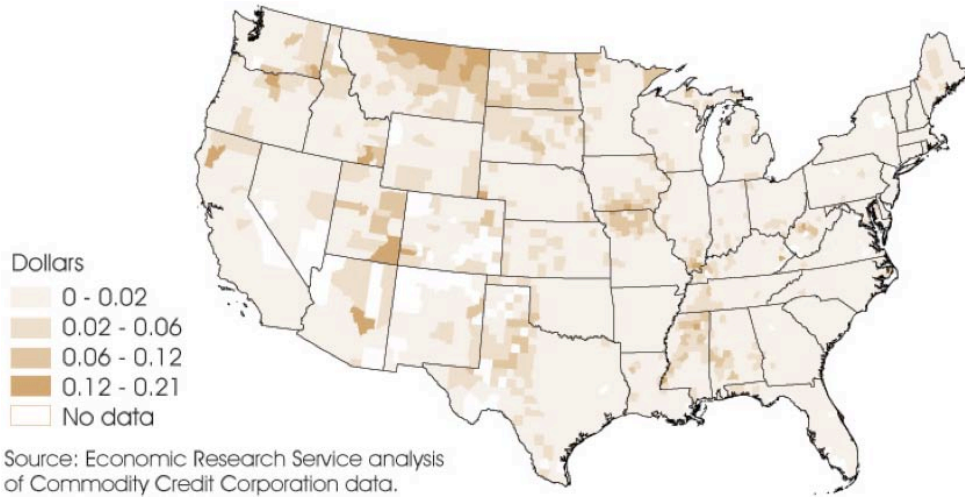
[125] University of Nebraska – Lincoln, Water Center. 2004. "UNL Study Looks at Economic Impacts of Water Allocations to Republican River Basin Economy" http://watercenter.unl.edu/research/unl_study.htm

Figure 10. Commodity Payments and Conservation Payments

Commodity Payments Per Dollar of Agricultural Sales



Conservation Payments Per Dollar of Agricultural Sales



Source: Claasen, R. and M. Morehart. 2006. *Greening Income Support and Supporting Green.* Economic Brief Number 1. U.S. Department of Agriculture, Economic Research Service. March.

Figure 10 provides some insight into both the incentives farmers have to produce commodities and the potential opportunities for shifting these incentives so they favor natural-resource amenities. The top portion of shows that farmers in most of the state participate in programs that provide federal commodity payments, at roughly the same level as

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(accessed December 6, 2005), and Supalla, R. 2004. "What Will a Water Cutback Cost Us?" *Nebraska Farmer* October.

farmers to the north, east, and south. The bottom of Figure 10, though, shows that Nebraska's farmers do not participate as extensively in programs that provide payments for conservation. This rough contrast indicates that, if federal farm programs shift away from commodities toward conservation, the shift may induce farmers to follow suit.

C. NEBRASKA'S NATURAL-RESOURCE AMENITIES AND RECREATION

It is not surprising that Nebraska has a considerable natural-resource-related recreation industry, given the high percentage of Nebraskans who indicate they consider wildlife-watching, fishing, and hunting important to their lives. This industry would expand even further, if Nebraskans make a greater effort to protect, enhance, and capitalize on the state's natural resources.

Table 10 provides an overview of Nebraska's recreational resources. According to data compiled by the State Comprehensive Outdoor Recreation Plan (SCORP) recently developed by the Game and Parks Commission, the state as a whole contains more than 1 million acres of land, water, and wetlands available for recreational use. Background data in the SCORP show, however, that only 10 percent or so of this area lies in the eastern region of the state, where most of the state's population resides. About 70 percent lies in the Panhandle and the north-central regions of the state, with the remainder in the southwest and south-central regions.

For the state as a whole, there are 0.618 acres of recreational land, water, and wetlands per person. This ratio varies considerably if one compares the recreational area against the population within each region. Near Omaha, the ratio falls 90 percent, to 0.006 acres per person. In contrast, in the north-central region, the ratio rises to more than 8 acres per person. These differences indicate that most of the state's population

Table 10. Recreational Lands, Water, and Wetlands in Nebraska, by Provider (Acres and Acres Per Person)

Provider	Total Acres	Acres Per Person
Local Gov't.	30,005	0.017
State Gov't.	300,525	0.176
Federal Gov't.	582,560	0.340
Private	144,855	0.085
Total	1,058,120	0.618

Source: Nebraska Game and Parks Commission. 2005. *State Comprehensive Outdoor Recreation Plan (SCORP): Assessment and Policy Plan 2006-2010 Draft,* p. 39.

Table 11. Total Value of Recreational Fishing, Wildlife-Watching, and Hunting Activities in Nebraska, 2001

Level of Activity[a] (days per year)	Trip-Related Value				Equipment and Other Expenditures (million)	Total Value (million)
	Expenditure per day[a,b]	Consumer's Surplus per day[c]	Total per day	Total (million)		
Fishing						
3,204,000	$18.81	$50	$68.81	$220.5	$86.1	$306.6
Wildlife-Watching[d]						
2,200,000	$8.19[e]	$37	$45.19	$99.4	$111.3	$210.7
Hunting						
2,204,000	$33.95	$49	$82.95	$182.8	$123.3	$306.1

Source: ECONorthwest.

[a] Estimates of activity and expenditures from Fish and Wildlife Service and U.S. Census Bureau. 2003. *2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation: Nebraska*. U.S. Department of the Interior, Fish and Wildlife Service and U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. FHW/01-NE-Rev. March.

[b] Does not include expenditures on fishing and hunting other than those related to trips.

[c] Estimates of consumer's surplus per activity day from Loomis, J. 2005. *Updated Outdoor Recreation Use Values on National Forests and Other Public Lands*. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Gen. Tech. Rep. PNW-GTR-658. http://www.fs.fed.us/pnw/pubs/pnw_gtr658.pdf (accessed December 10, 2005). *See* Table 2.

[d] Non-residential (away from home) wildlife-watching.

[e] Data reported by the Fish and Wildlife Service and U.S. Census Bureau (2003) do not distinguish between trip-related and other expenditures. We assume all wildlife-watching expenditures reported by participants apply to non-residential activities.

must travel more than one-hundred miles to take advantage of most of the state's resource-related recreational opportunities. In its discussion of how the state's supply of recreational resources compares with national assessments of the demand for outdoor recreation, the SCORP concludes that "Nebraska's existing recreational facilities do not and will not meet the population's needs because of their locations [away from population centers]."[126] This information suggests that, to increase the recreation-related consumer's surplus for the bulk of the state's population—and, hence, to initiate a significant stimulus to recreation-related, amenity-driven growth—there must be a substantial improvement in the recreational amenities readily accessible to the state's urban residents.

The data in Table 11 show that fishing, wildlife-watching, and hunting already play a substantial role in Nebraska's economy, with a total value of more than $800 million in 2001. The total value of each activity has two components: what participants actually spent on them, and the additional

[126] Nebraska Game and Parks Commission. 2005. *State Comprehensive Outdoor Recreation Plan (SCORP): Assessment and Policy Plan 2006-2010 Draft,* p. 43.

amount (called consumer's surplus) they would have been willing to spend. Anglers, for example, spent 3,204,000 days fishing in Nebraska's waters and, on average, incurred $19 per day in trip-related expenditures, and enjoyed consumer's surplus of $50 per day. Adding these numbers indicates the total willingness to pay—consumer's surplus plus expenditures—is ($19 + $50 =) $69 per angler-day. This amount, multiplied times the number of angler-days and including other expenditures yields $306.6 million, the total value of the state's ecosystem goods and services that support this activity. The total economic value of all three activities was $823.4 million.

Anglers spent $60.3 million in trip-related expenditures in Nebraska, plus another $86.1 million not related to trips, for a total of $146.4 million in 2002. Wildlife-watchers spent $129.3 million. Hunters spent $74.8 million in trip-related expenditures, plus $123.3 million on other goods and services, for a total of $198.1 million. Overall, expenditures for the three types of activities totaled $473.8 million. As large as these numbers are, however, it is important to note that they could be larger, if Nebraska were able to attract more recreationists, especially those from out-of-state who typically spend more, often several times more, than in-state recreationists.

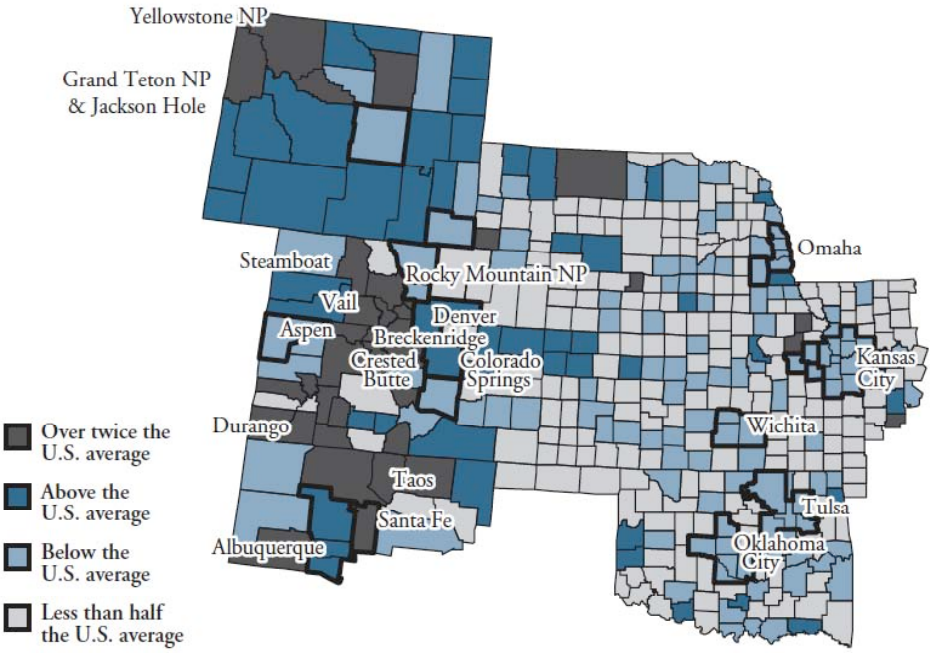
Anglers derived a consumer's surplus of $160.2 million from their fishing activities in Nebraska in 2001. Wildlife-watchers enjoyed a total consumer's surplus of $81.4 million, and hunters' consumer's surplus was $108 million. Overall, the consumer's surplus, or net economic benefit, for the three activities totaled $349.6 million. We estimated these values by applying to Nebraska the results of studies conducted in the general region. Actual values may be higher or lower.

The values shown in Table 11 notwithstanding, Nebraska's recreation industry is small, when compared to most other states. Figure 11 shows the importance of the travel-and-tourism industry, as measured by its share of total employment, for Nebraska and neighboring states. For most of Nebraska's counties this share is well below the national average. The notable exceptions are some of the counties along the Platte River, the Niobrara River in the north, and the Missouri River along the state's eastern edge. Nebraska as a whole ranks among the bottom ten states in terms of the share of total employment that occurs within this industry.[127] The industry has been growing, though: its share of total statewide economic output grew about 50 percent from the early 1980s to the late 1990s, about twice as fast as in Colorado and Missouri. The extent to which this growth is linked to natural-resource and other types of amenities is not known.

The map in Figure 12 offers another perspective of recreation's

[127] Wilkerson, C. 2003. "Travel and Tourism: An Overlooked Industry in the U.S. and Tenth District." *Economic Review: Federal Reserve Bank of Kansas City*: 45-67.

Figure 11. Employment in the Travel and Tourism Industry, as a Share of Total Employment, 2000

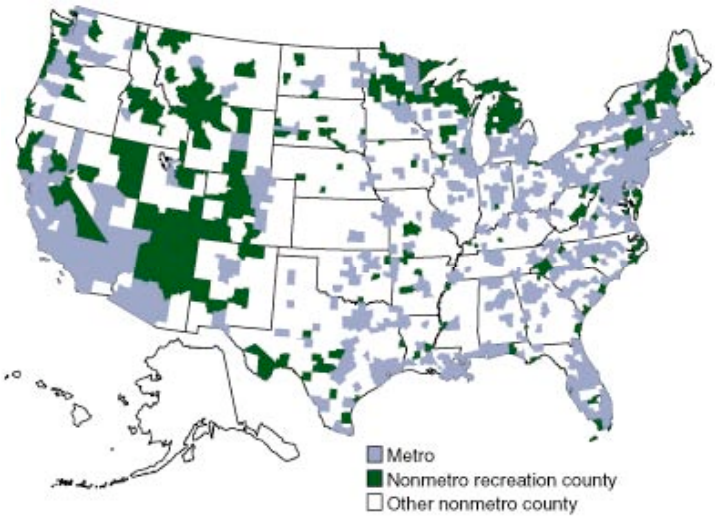


Source: Wilkerson, C. 2003. "Travel and Tourism: An Overlooked Industry in the U.S. and Tenth District." *Economic Review: Federal Reserve Bank of Kansas City*: 45-67.

importance to local economies. It shows for rural counties an index of recreational activity that reflects several factors: employment and income earned in recreation-related sectors of the economy; percentage of housing units intended for seasonal or occasional use; and sales by motels and hotels. The index indicates only three Nebraskan counties—Keith, Gosper, and Wheeler—have a high concentration of recreation-related economic activity. Notable amenities in these counties are Lake McConaughy, Johnson Lake, and Lake Ericson, respectively.

Perhaps these maps indicate the rest of Nebraska lacks recreational amenities able to generate amenity-driven growth. An alternative explanation, though, is that the state possesses amenities with such a capability, but, so far, Nebraskans have not taken advantage of them. To the extent this latter explanation is correct, then the lack of recreational activity today means there are opportunities for future efforts to fill in the gap. These opportunities may materialize in different ways. One or more communities, for example, may be able to accent their amenities and recreational opportunities so they stand out in what many see as a bleak landscape. Or, communities throughout the state may make a concerted effort. Whatever form it takes, greater accent on the state's recreational opportunities might induce some residents to take advantage of these opportunities rather than travel outside the region. Or, if accomplished with enough scope, a community or set of communities might establish a new regional identity that attracts recreationists from elsewhere.

Figure 12. Nonmetropolitan Counties with a High Concentration of Economic Activity Linked to Recreation, 2002



Source: Beale, C.L. and K.M. Johnson. 2002. "Nonmetro Recreation Counties: Their Identification and Rapid Growth." *Rural America* 17 (4).

The map in Figure 12 shows where some of this opportunity may be located. Recreational centers in the Great Plains generally are tied to water resources. This is especially true for the string of recreation-oriented counties along the Missouri River, in South Dakota. This string ends, though, once the river reaches Nebraska, raising the possibility that, with improvements in environmental quality and access, the Missouri River could support a significantly larger recreational industry.

Additional opportunity exists with Lake McConaughy. A recent study by Professor Ray Supalla, an economist from the University of Nebraska-Lincoln, found the lake, the largest body of water in a larger region that stretches from east of Omaha to west of Denver, has few links to the state's economy and, hence, significant unrealized recreational potential.[128] Access to the lake's amenities is limited to a few sites. Private investment has not developed the companion amenities for families that one often finds at lakes that receive greater use. The study's lead author observed that many visitors come from Colorado in large recreational vehicles, which they stock with groceries, gas, and other items purchased at home; return when the supplies are depleted; and spend little money in Nebraska. Moreover, visitors have little exposure to the local economy, as the most direct route to the lake from Interstate-80 avoids the nearby town of Ogalalla. Consequently, Nebraskans are able to capture little of the economic activity generated by their visits.

[128] Supalla, R., T. Buell, and S. Stricker. 2005. *Economics of Management Options for Lake McConaughy: Executive Summary*. Department of Agricultural Economics, University of Nebraska–Lincoln. December 13.

The Valentine area also demonstrates recreational potential. The City of Valentine sits near a section of the Niobrara River that has been designated the Niobrara National Scenic River. It also is near the Samuel R. McKelvie National Forest, the Valentine and Fort Niobrara National Wildlife Refuges, Merritt Reservoir, and the Sandhills. Recreational visits to these areas have been growing steadily: in 2004 the river received 54,000 visitors and the two refuges received 40,000 and 120,000 visitors, respectively.[129] Nearly all the visitors come from outside the local area.[130] The area is reminiscent of others in which destination resorts have evolved in western states: an aesthetically attractive community that already is experiencing growth in recreational activity amid multiple natural-resource amenities—including access to public lands and waters.

Development of the local tourism industry happened essentially by accident, however, after decades in which businesses in the community were oriented toward livestock production.[131] It began as recreationists recognized that the economic value of the area's resource-related recreational opportunities exceeds the travel and other costs they incur to take advantage of the opportunities. As the number of recreationists in the area increased, eventually local entrepreneurs realized the business opportunities associated with providing lodging, guiding, and other services. Researchers have concluded that, although livestock remains important, "[I]f asked, most current residents in Valentine will say that tourism is in fact now the primary industry in the community." Demand for the area's resource-related amenities now generates jobs and incomes in motels, restaurants, service stations, outfitters, and other sectors.

Ponca State Park, in the northeast corner of the state, offers another opportunity for publicly owned resources to spur economic activity. It attracted 558,500 visitors in 2004, and surveys indicate 40 percent of visitors come from out of state.[132] Part of the attraction is the park's location as the eastern gateway to the Missouri River National Recreational River—a 59-mile reach with the only unchannelized portion of the river in Nebraska. The park has recently spurred the development of upper-end housing nearby, as households recognize the attractiveness of living adjacent to a large tract of public land. Further development seems likely, insofar as state and federal agencies plan to expand the amount of contiguous, riverside land managed for conservation and recreational use.

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[129] Nebraska Department of Economic Development. 2005. *Attendance at Selected Nebraska Attractions.* http://info.neded.org/stathand/msect4c.htm (accessed December 19, 2005).

[130] Davenport, M., K.M. Flitsch, J. Thompson, D.H. Anderson. 2002. *2001 Niobrara National Scenic River Visitor Study: Final Report.* Niobrara National Scenic Park, National Park Service and University of Minnesota, Cooperative Park Studies Program. September.

[131] Lewis, J.B. and L. Delisle. 2004. "Tourism as Economic Self-Development in Rural Nebraska: A Case Study." *Tourism Analysis*. 9(3), 153-166.

[132] Nebraska Travel and Tourism Division. *2004 Nebraska Tourism Industry Development Plan*.

Elsewhere, opportunities exist for bird-watching to generate economic activity. The Middle Platte River area already has an established identity as a good bird-watching site, especially for watching Sandhill and Whooping cranes. A 1996 survey of visitors who came to the Middle Platte River area to watch birds during crane-migration season found the average party consisted of more than 5 individuals who stayed in the area for 3 days and spent $285 per person.[133] Throughout the year, respondents to the survey averaged 3.5 trips and spent $790. Visitors' trip-related spending on wildlife-watching trips to the area totaled $13 – $20 million. Respondents to the survey indicated that, on average, they were willing to pay an additional $193 per trip, so that the total consumer's surplus visitors enjoyed from their trips was $2.8 – $4.4 million. Thus, the survey findings indicate that, in 1996, birders placed a value of $15 – $25 million on the recreational opportunities supported by the area's wildlife.

National surveys, however, indicate more is possible, insofar as the number of Americans participating in bird-watching activities has been increasing rapidly. Table 12, which reports the changes in participation for different recreational activities between 1982-83 and 1994-95, shows that the number of Americans participating in bird-watching activities increased 155 percent, faster than any other outdoor-recreation activity. The researchers who conducted the surveys generally anticipate further growth for bird-watching and other activities that grew between 1982-83 and 1994-95, as the population increases and households have more discretionary income to spend on recreation. They anticipate little or no growth in some activities, such as hunting and fishing.

Most of the activities listed in Table 12 potentially could be supported by Nebraska's natural resources. Indeed, Nebraskans along the central Platte River have taken some steps to make this happen, seeing the annual bird migration as an economic-development opportunity rather than as an annoyance. Similarly, residents of the Valentine area have begun to generate investment, jobs, and incomes from recreationists' expenditures. In addition, landowners throughout the state sell opportunities to hunt and fish on their land. For example, the Northwest Nebraska High Country Association of farmers and ranchers offers lodging, hunting, and outdoor recreation on their properties located in the Pine Ridge area of northwest Nebraska.

And, as the data in Table 13 demonstrate, the network of state parks attracts several million visitors annually. In general, the state parks with the best access from population centers and Interstate 80, as well as those with the most extensive ancillary facilities, such as picnicking areas, have the greatest recreational use.

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[133] Fermata Inc. 1996. *Platte River Nature Recreation Study: Executive Summary*. http://www.fermatainc.com/basic/eco_nebplatte.html (accessed November 11, 2005).

Table 12. Growth in Outdoor Recreational Activities, 1982-83 to 1994-95

Activity	Number in 1982-93 (millions)	Number in 1994-95 (millions)	Growth (percent)
Bird Watching	21.2	54.1	155.2
Hiking	24.7	47.8	93.5
Backpacking	8.8	15.2	72.7
Downhill Skiing	10.6	16.8	58.5
Attending a Concert or Play	44.2	68.4	54.7
Off-Road Driving	19.4	27.9	43.8
Walking	93.6	133.7	42.8
Sightseeing	81.3	113.4	39.5
Swimming/Non-pool	56.5	78.1	38.2
Attending a Sports Event	70.7	95.2	34.7
Snowmobiling	5.3	7.1	34.0
Golf	23.0	29.7	29.1
Outdoor Team Sports	42.4	53.0	25.0
Camping (overall)	42.4	52.8	24.5
Developed Area	30.0	41.5	38.3
Primitive Area	17.7	28.0	58.2
Cross-Country Skiing	5.3	6.5	22.6
Boating	49.5	58.1	17.4
Swimming/Pool	76.0	88.5	16.4
Picnicking	84.8	98.3	15.9
Sledding	17.7	20.5	15.8
Running/Jogging	45.9	52.5	14.4
Bicycling	56.5	57.4	1.6
Fishing	60.1	57.8	-3.8
Horseback Riding	15.9	14.3	-10.1
Hunting	21.2	18.6	-12.3
Tennis	30.0	21.2	-29.3

Source: Cordell, H.K., B.L. McDonald, J. A. Briggs, R.J. Teasley, R. Biesterfeldt, J. Bergstrom, and S.H. Mou. 1997. *Emerging Markets for Outdoor Recreation in the United States*. Sporting Goods Manufacturers Association and the U.S. Department of Agriculture, Forest Service. April.

The citizens of Omaha, Lincoln, and South Sioux City have widely supported the development of urban trails for biking, walking, and jogging. Some Nebraskans (and Iowans) are promoting the development of a trail system, along both sides of the Missouri River, to serve as the focal point for economic activity not just by local residents but also by bicyclists and other recreationists from other states and countries.

Table 13. Attendance at Selected Attractions near the Missouri River, 2002 and 2004

Attraction	Total Attendance
Two Rivers State Recreation Area (west of Omaha)	474,560
Louisville Lakes State Recreation Area[a]	589,500
Platte River State Park[a]	471,500
Ponca State Park[a]	558,500
DeSoto National Wildlife Refuge	270,000
Lewis and Clark State Recreation Area[a]	272,685
Arbor Day Farm – Nebraska City	150,000
Indian Cave State Park[a]	167,050
Fontenelle Forest Nature Center	90,000
Arbor Lodge State Historical Park – Nebraska City[a]	129,100
Fort Atkinson State Historic Park	115,622
River City Star Riverboat	22,000
Boyer Chute National Wildlife Refuge	20,979
Pelican Point State Recreation Area	7,000

Source: ECONorthwest, with data from the *2004 Nebraska Tourism Industry Development Plan.*

[a] Data for 2004 from Nebraska Game and Parks Commission.

Other communities also have begun developing a trail network. The motivations and opportunities for doing so vary, but these efforts demonstrate a growing awareness of the economic importance of recreational opportunities associated with natural resources. These three trails are illustrative:

- The Cowboy Trail, the nation's longest trail developed atop a former rail line, will stretch 321 miles when completed, from Norfolk through the Elkhorn River valley to Chadron, in the Pine Ridge area. Only 47 miles were completed by 2001; almost 150 miles by 2006. The trail has 221 bridges decked and completed.
- The Oak Creek Trail runs 13 miles along natural prairie grass, oak woodlands and highland vistas, from Valparaiso to near Brainard. The corridor was once occupied by the Union Pacific Railroad but was taken out of service, using the Federal Rail Bank process in 1993.
- The Mo-Pac East trail extends 25 miles from Lincoln east to Wabash. An equestrian trail runs parallel part of the way, from Lincoln to Elmwood. Plans call for extending the trail over a

recently completed bridge over the Platte River and connect with the Omaha trail network.

A recent survey of residents living in rural communities near these trails found broad perceptions that trails are economically beneficial.[134] In these rural areas, more respondents said that proximity to the trail shortened rather than lengthened the period of time it takes to sell a home (18 percent vs. 6 percent); increased the sale price of homes (13 percent vs. 5 percent); and that it positively influenced the respondents' home-purchase decisions (24 percent vs. 2 percent). Also, 42 percent of the respondents said they believe the trails have a positive impact on local economic opportunities, while only 2 percent said the impact is negative. (For each variable, other respondents indicated the trails have no effect.) Although these responses are too general to support conclusions about the economic value of the amenities associated with the trails, they do indicate that many Nebraskans perceive the amenities as having a positive influence.

We do not intend for this brief discussion to provide an exhaustive list of the connections between Nebraska's recreational industry and its natural-resource amenities. An exhaustive list, however, would not be dramatically longer. For the most part, neither the state's public sector nor its private sector has aggressively sought to develop resource-related recreational enterprises. This inertia seems to be changing, though, as some of the state's political leaders have supported the recent investigation into the recreational potential at Lake McConaughy, conferences to identify and discuss opportunities for resource-related recreation, and this report.

These efforts notwithstanding, however, significant impediments must be overcome, if Nebraska is to accomplish any meaningful expansion of the resource-related recreational industry. Some of these impediments may be nothing more than habits. Although Nebraskans readily praise the quality of life they derive from the state's natural-resource amenities, it seems to us that they far less frequently see, or even look for, the business enterprises these amenities might support. To take full advantage of the state's opportunities for amenity-driven growth, though, the state must erase the other impediments we described above: environmental degradation and poor access.

[134] Greer, D. 2001. *Nebraska Rural Trails: Three Studies of Trail Impact.* National Park Service, Rivers, Trails and Conservation Assistance Program. October. The survey also included residents near the Wabash-Trace Trail extending 63 miles, from Council Bluffs, Iowa, to Blanchard Missouri.

D. NATURAL-RESOURCE AMENITIES, ENVIRONMENTAL VALUES, AND NEBRASKA'S ECONOMY

This aspect of the relationship between Nebraska's natural resources and its economy has two components. One occurs when the nonuse values people place on species or special landscapes induce changes in behavior, either voluntarily or through regulation. The other occurs when the ecosystem provides services that have considerable value, even though the value generally goes unnoticed. To the extent that degradation of the environment limits the provision of these services, households, firms, and communities must go without or incur costs to replace them.

To our knowledge, little research has directly addressed either component of these environmental values in Nebraska. In one notable study, published in 1988, researchers estimated the value people place on Whooping cranes.[135] They found that, on average, households across America were willing to pay between $5 and $149 per year (in the dollars of 1983) to preserve the species. If these findings apply today, then, in today's dollars, households are willing to pay between about $9 and $270 per household. These amounts, multiplied times the number of households in the country (105,480,000 in 2000) indicates the total preservation value of the nation's Whooping cranes is in the neighborhood of $1 – $28 billion. Not all of this amount is nonuse value, insofar as many people engage in recreational activities that involve watching Whooping cranes. Furthermore, this value does not apply solely to Nebraska, for the birds spend only part of the year in the state. These qualifications notwithstanding, though, it is clear that nonuse values associated with Whooping cranes may be large enough to motivate the American public to support actions, regulatory and otherwise, to protect the species.

Similar nonuse values may apply to many additional species and the habitats on which they depend. A recent assessment identified more than 600 species that face significant risk of extirpation within Nebraska, if not total extinction.[136] Table 14 identifies 80 species considered to be "globally or nationally most at-risk of extinction and which occur in Nebraska." Past experience indicates the public probably places substantial value on avoiding extinction for each of these species, for some more than others, and on avoiding significant degradation of related habitats. Under appropriate circumstances, this value is likely to trigger regulatory actions to restrict behavior harmful to these species. Such restrictions may have a harmful impact on the state's economy. Past experience with the management of at-risk species indicates, however, that, the impacts

[135] Bowker, J. and J. Stoll. 1988. "Use of Dichotomous Choice Nonmarket Methods to Value the Whooping Crane Resource." *American Journal of Agricultural Economics* 70(2): 372-381.

[136] Schneider, R., M. Humpert, K. Stoner, and G. Steinauer. 2005. *The Nebraska Natural Legacy Project: A Comprehensive Wildlife Conservation Strategy*. Nebraska Game and Parks Commission. August.

Table 14. Nebraskan Species Most At-Risk of Extinction

Birds	**Insects**	**Mollusks**	**Plants**
Bald Eagle	American Burying Beetle	Fatmucket	American Ginseng
Bell's Vireo	Bucholz Black Dash	Flat Floater	Barr's Orophaca
Brewer's Sparrow	Iowa Skipper	Pimpleback	Blowout Penstemon
Buff-breasted Sandpiper	Ottoe Skipper	Pistolgrip	Colorado Buterfly Plant
Burrowing Owl	Platte River Caddisfly	Plain Pocketbook	Dog-Parsley
Cerulean Warbler	Regal Fritillary	Pondmussel	Gordon's Wild Buckwheat
Ferruginous Hawk	Salt Creek Tiger Beetle	Scaleshell	Hall's Bulrush
Greater-Prairie Chicken	Tawny Crescent	Slough Sandshell	Iowa Moonwort
Henslow's Sparrow		Threeridge	Large-Spike Prairie-Clover
Interior Least Tern	**Reptiles**	Higgins Eye	Matted Prickly-phlox
King Rail	Blanding's Turtle		Meadow Lousewort
Lewis' Woodpecker	Massasauga	**Fish**	Missouri Sedge
Long-Billed Curlew	Timber Rattlesnake	Blacknose Shiner	Saltwort
McCown's Longspur		Blue Sucker	Sandhill Goosefoot
Mountain Plover	**Mammals**	Finescale Dace	Short's Milkvetch
Piping Plover	Fringe-Tailed Myotis	Lake Sturgeon	Small White Lady's-slipper
Short-Eared Owl	Long-legged Myotis	Northern Redbelly Dace	Snow Trillium
Trumpeter Swan	Northern River Otter	Pallid Sturgeon	Ute Ladies' Tresses
Whooping Crane	Plains Harvest Mouse	Pearl Dace	Western Prairie White-Fringed Orchid
	Plains Pocket Mouse	Plains Topminnow	Wolf's Spikerush
	Rocky Mountain Bighorn Sheep	Sicklefin Chub	
	Southern Flying Squirrel	Sturgeon Chub	
	Swift Fox	Topeka Shiner	
	Townsend's Big-Eared Bat		

Source: Schneider, R., M. Humpert, K. Stoner, and G. Steinauer. 2005. *The Nebraska Natural Legacy Project: A Comprehensive Wildlife Conservation Strategy*. Nebraska Game and Parks Commission. August.

will be mixed: some positive and some negative. The overall impact may be positive, especially when regulations restrict actions that are inefficient, wasteful, or subsidized.

Some landscapes in Nebraska also are at risk of disappearing and these, too, may have nonuse values that affect the state's economy. The *Nebraska Natural Legacy Project* reports that Nebraska has 40 biologically unique landscapes, some of which have been markedly altered. Less than one percent remains of the tallgrass prairie that once covered what is now the eastern portion of the state and extended to Indiana, and from Texas to southern Canada, for example.

Natural resources influence Nebraska's economy when they provide valuable services, even those that go unnoticed. Shallow aquifers connected to the Lower Platte River, for example, provide potable water for most of the state's urban residences and industries, but the costs of

municipal water might rise if the aquifer becomes polluted. Research elsewhere indicates that being able to rely on the ecosystem for high-quality water can save municipal water-users more than $10 per person per year.[137] And a study in Iowa found that, all else equal, the value of residential properties near a lake with higher water quality were 13–23 percent higher than those near a comparable lake with lower water quality.[138]

E. REFLECTIONS

In some parts of the state, the value of recreational and other amenities provided by Nebraska's natural resources can compare favorably with, even exceed, the value of the agricultural goods and services they provide when used to produce crops and livestock.

- A 2005 assessment found that, when used to produce crops, the annual value of the agricultural goods and services is about $97 per acre, on average; when used to produce pasture, the annual value is $12 per acre.[139] Lands dedicated to the production of crops and pasture have an average value of $1,430 and $310 per acre, respectively.

  In comparison, the 1998 economic analysis of Necedah National Wildlife Refuge, in Wisconsin, (*see* Text Boxes 1–3) found it annually produced recreational goods and services (fishing, hunting, and wildlife-watching) with an annual value of $120–$180 per acre.[140] Preservation of the area's ability to provide these and other amenities, including the protection of rare species, has a value of $2,600–$6,800 per acre. Similar values can be expected for lands in Nebraska with similar characteristics: land that is nearly level, with sandy soils; a sinuous stream with many oxbows, small ponds; a predominant plant community of riparian (streamside) forest; breeding habitat for migratory birds, waterfowl, and other wildlife; and an important corridor for birds, birds, butterflies, and other migratory species.

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[137] Hulse, D., G. Grant, E. Niemi, A. Branscomb, D. Diethelm, R. Ulrich, and E. Whitelaw. 2002. *Muddy Waters: How Floods Clarify Evolving Relationships among Landscape Processes and Resource Management Decision-Making in Municipal Watersheds*. National Council on Environmental Research and Quality Assurance, U.S. Environmental Protection Agency GAD # R825822.

[138] d'Arge, R. and J. Shogren. 1989. "Non-Market Asset Prices: A Comparison of Three Valuation Approaches." In *Valuation Methods and Policy Making in Environmental Economics*. Edited by H. Folmer and E. van Ierland. Amsterdam: Elsevier. Pgs. 15-36.

[139] U.S. Department of Agriculture, National Agricultural Statistics Service. 2005. *Land Values and Cash Rents: 2005 Summary*. August.

[140] Total value is the sum of recreational expenditures plus consumer's surplus. Expenditures (Text Box 2) were $80.91 per acre, consumer's surplus (Text Box 1) were $60.50–$103.10, and total value ≈ $120–$180 per acre.

- The 2002 agricultural census found that resources dedicated to agricultural production in Nebraska produced crops and livestock with a net value of about $890 million.[141] In comparison, the resources that supported fishing, hunting, and wildlife-watching activities in the state in 2001 had a net value (consumer's surplus) of about $350 million (see the discussion accompanying Table 10). The difference between the two numbers is smaller than one might anticipate, given agriculture's dominant presence across the state's landscape. Moreover, it seems reasonable to conclude that the difference is actually smaller than these numbers suggest. Agriculture's overall net production is diminished insofar as agricultural operations also impose costs on others, by degrading or consuming publicly-owned resources—water supplies, water quality, fish and wildlife habitat, etc.—without compensation. In contrast, the net value of resources used for these three recreational activities is enhanced insofar as these resources also provide other valuable goods and services, such as opportunities for recreational boating, scenic vistas, clean water, and habitat for rare species.

For the most part, though, Nebraskans have not protected, enhanced, and capitalized on these amenity values, exploiting instead the ecosystem's ability to produce goods and services for agriculture, electricity production, waste assimilation, and other uses. These uses certainly produce extensive economic benefits, but at a cost that grows as amenity-driven growth becomes more important. By overlooking the forgone jobs and income that are and could be generated—even in the farm sector—by producing amenities from the state's resources, Nebraska is falling short of the state's full potential. Lost opportunities to produce more jobs and income are passing every year, and failure to account for them imposes ever-mounting harm on the state's ability to provide for the economic well-being of its citizens, now and in the future.

Giving greater emphasis to resource-related amenities would not solve all Nebraska's economic challenges, nor would it guarantee economic prosperity for all. Considerable evidence indicates, however, that prudent implementation of a sound strategy to promote amenity-driven growth probably would benefit many Nebraskans, now and in the future.

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[141] U.S. Department of Agriculture, National Agricultural Statistics Service. 2004. *2002 Census of Agriculture: State Summary Highlights*. June. http://www.nass.usda.gov/census/census02/volume1/ne/index2.htm (accessed January 6, 2006).

V. LOOKING FORWARD

What should Nebraskans do if they want to derive a more positive contribution to the state's economy from its natural-resource amenities? This is a question only Nebraskans, themselves, can answer. To those who might accept the challenge we offer seven lessons from the experiences of other states and communities that have addressed similar questions.

#1. Meaningful change will require a fundamental transition in attitudes and behavior. Efforts to capitalize on the ability of natural resources to produce amenities often have been accompanied by a fundamental transition in the attitudes and behavior of people and institutions throughout the surrounding area. Over the past two decades, for example, people in the Pacific Northwest realized that forests could contribute more to the economy if left standing rather than cut into logs. As the timber industry invested in labor-saving technology, loggers and millworkers realized their job prospects had diminished markedly and sought retraining and jobs in other industries. Banks, grocery stores, and other businesses whose profitability had been linked to the fortunes of the timber industry found, instead, that profits rose as the timber industry contracted, new people moved into town, and new industries emerged. Business and political leaders who once believed that economic devastation would occur unless environmental-protection and other policies accommodated the interests of the timber industry saw, instead, that the economy became more robust with policies that emphasized the region's quality of life and the education of its citizens. Communities that once held logging festivals now hold festivals celebrating the planting of trees and the protection of rivers.

Efforts to capitalize on the ability of Nebraska's natural resources to produce amenities probably will enjoy no more than limited success without a similar, fundamental transition in attitudes and behavior. Nebraskans have a long history of capitalizing, instead, on the ability of the state's land and water resources to produce commodities, with notable success. Given this state of affairs, many will ask, Why do things differently in the future? This is a legitimate question. Those who advocate devoting more resources to the production of amenities must provide a compelling answer before they can expect support from landowners, water users, the business community, and political leaders.

Answering the question is made especially difficult because, whenever a change in the economy occurs, the costs of the change are far more apparent than the benefits. In response to a proposal to use land and water to produce recreational opportunities instead of crops, for example, people will more easily envision the potential negative impacts (reduced crop production, lower farm earnings, fewer purchases from farm-supply stores, etc.) than the potential positive impacts (new people attracted to town who will stimulate the emergence of new businesses and new jobs).

Indeed, the negative impacts may be certain and immediate, while the positive impacts may not materialize for a considerable period. Reversing the effects of environmental degradation, for example, may take years.

Answering the question also is made difficult because, to some extent, the benefits of producing amenities rather than commodities will not necessarily accrue to the same people who bear the costs. A farmer, for example, may incur the daily costs of curtailing corn production to improve fish and wildlife habitat, while the benefits may accrue to birders and anglers who live elsewhere and visit only on weekends.

These difficulties, and there are others like them, illustrate the fundamental significance of the transition that experiences elsewhere indicate must occur here before there will be sufficient change in attitudes and behavior to generate a meaningful increase in the state's production of resource-related amenities in pursuit of amenity-driven growth.

#2. Compare alternative futures, not the future with the past. Changing the management of a specific natural resource from producing commodities to producing amenities makes economic sense only if doing so will yield a brighter economic future: more jobs and income. As we explain above, strong evidence indicates this is the case in Nebraska, for the state and many of its communities have significant economic challenges that probably cannot be addressed meaningfully without improving the state's resource-related amenities. Thus, there are good reasons to anticipate that Nebraska's overall economic future will be more robust with increased production of resource-related amenities than without it.

Often, however, people tend not to evaluate new ideas by comparing what the future will look like with the change vs. what it will look like without it. Instead, they compare the future with the past, taking a dim view, initially at least, of changes that would make the future different from the past. It should be no surprise, therefore, if Nebraskans are initially widely skeptical of proposals to protect, enhance, and capitalize on the state's resource-related amenities.

Communities and states that have wrestled with challenges similar to those Nebraska faces have often encountered extreme controversy over such proposals. The controversy has diminished, though, as people recognized that the proposals would lead not to a devastating break with the past but to a stronger economic future. This experience indicates that Nebraskans should anticipate something similar. Proposals to protect, enhance, and capitalize on the state's natural-resource amenities are likely to elicit controversy, which will diminish only as people look to the future, not the past, and make with-vs.-without comparisons.

#3. Be realistic. Address fairness issues openly. Efforts in other states to increase the amenity values of natural resources have sometimes stumbled because advocates have over-sold the benefits and ignored the

costs. We recommend candor as the best policy. Prudent efforts to change the management of some of Nebraska's natural resources to increase their amenity value probably will yield significant economic benefits, but they also will generate economic costs. They probably will cause some individuals, firms, and communities to emerge as economic winners, others as losers. They probably will alleviate some of Nebraska's economic challenges, but they certainly will not alleviate all of them.

Some states and communities elsewhere have found that having candid discussions of the good and the bad was a prerequisite for dampening the controversy over proposals to increase the use of natural resources in pursuit of amenity-driven growth. Not incidentally, doing so also allowed an equally open discussion of the good and the bad of continuing to use resources to pursue commodity-driven growth, and of alternative views of the future. Often, what one sees as the positives and negatives of amenity-driven growth arise from his or her expectations of the future. In our experience, the most ardent opponents of managing resources for their amenity- rather than their commodity-value often expect the commodity industries that generated wealth in the past to continue to do so unabated in the future. The most ardent supporters, conversely, expect these industries to weaken. Looking at the two alternative futures, plus the good and the bad of each, side-by-side, is essential if people are to make informed decisions between the two.

Such discussions, in our view, must candidly address economic forces and trends outside Nebraskans' control, and consider risk-management strategies for coping with them. Nobody knows for sure if the negotiations at the World Trade Organization will force sharp reductions in farm subsidies, if climate change will produce an extended drought, if changes in energy technologies will create unprecedented, sustained demand for ethanol derived from corn, or if any number of potential events will unfold. In considering alternative resource-management and economic-development strategies, it is important to make some predictions of the future based on whatever evidence one feels relevant, and then consider the implications if the predictions should prove correct and if they don't.

We, for example, predict amenity-driven growth will become a more important determinant of Nebraska's economic future. If Nebraskans act now to enhance their amenities in a meaningful way and our predictions prove correct, the state will see more jobs and income. If they take these actions and our predictions don't prove accurate, however, then Nebraskans probably will be able to reverse direction quite easily: land and water used in a failed attempt to stimulate economic activities associated with fishing, boating, and bird-watching, for example, can be returned to producing corn. The risks associated with taking an opposite view are not symmetrical, however. If Nebraskans predict high future profits growing corn and livestock, dedicate even more land and water toward this end, and find that prediction proves incorrect, the damage to the state's amenities—or, equally important, the damage to the state's reputation—may be more difficult to reverse.

#4. Emphasize urban-rural connections. Many Nebraskans, like their counterparts in other states, see the state as having two parts: rural and urban. Often, this perspective becomes an us-vs.-them mindset, exacerbated because urban residents often place a higher value than rural residents on natural-resource amenities in rural areas.[142] Consequently rural residents feel put upon when urban residents push to convert natural resources from the production of commodities to the production of amenities, and urban residents become impatient with the reluctance of their rural brothers and sisters to embrace economic change.

The truth of the matter is that, in economic terms, Nebraska's rural and urban areas are joined at the hip, and amenity-driven growth probably will not become much of a factor in Nebraska unless rural and urban areas of the state cooperate. Here, as elsewhere, most economic activity and nearly all economic growth occur in urban centers. Insofar as future improvements in the state's natural-resource amenities stimulate amenity-driven growth, much of it probably will materialize first in urban areas, as they attract more highly-educated individuals who find attractive the combination of living in the city and recreating in the country. In time, though, this growth is likely to yield more visible economic benefits to rural communities, as rural businesses develop to meet the recreational demands of urban residents, for example. Rural areas also might benefit as urban residents bear at least some of the costs of developing the roads, recreational facilities, and other infrastructure necessary to improve access to rural amenities, infrastructure that might also serve other purposes for rural communities.

Indeed, urban-rural differences should not be overplayed. A 1999 survey found that many Nebraskans living in rural communities want to continue doing so, but fear that the future unfolding in these communities will not yield the quality of life and standard of living they desire.[143] They are looking for some change that will give them a better chance to earn a reasonable living in their communities. History shows that few rural communities can effect such change on their own. Hence, in many communities one may find convergence of interests for rural and urban interests.

#5. Don't focus solely on recreation expenditures. When many people think about resource-related, amenity-driven growth, they focus only on the potential for developing new jobs and income in the recreation industry. This perspective is too narrow. Recall, from our discussion

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[142] Allen, J.C., R. Vogt, and S. Ko. 2001. *Relationship Between Community Attributes and Residential Preference in Nonmetropolitan Nebraska.* University of Nebraska – Lincoln, Center for Applied Rural Innovation.

[143] Allen, J.C., R. Filkins, and S. Cordes. 1999. *Rural Nebraska Tomorrow: The Gap between the Preferred and Expected Future.* Nebraska Institute of Agriculture and Natural Resources, Center for Rural Community Revitalization and Development. August. http://cari.unl.edu/ruralpoll/future.pdf (accessed January 26, 2006).

above, that the driving force behind resource-related recreation is consumer's surplus. Nebraska's natural resources will attract only those recreationists who perceive that they will realize a greater consumer's surplus by visiting them rather than going elsewhere. This demand then can translate into jobs and incomes in the recreation industry when firms capture some of the surplus. The more people pay to recreate at a site, though, the lower the consumer's surplus. Thus, if a recreationist would be willing to pay $100 to visit a site and the owner of the site were to charge $100 for admission, all the consumer's surplus would be lost and the recreationist would go elsewhere. Generating high consumer's surplus is a key ingredient in deriving economic benefits from amenities.

Recall, also, that some resource-related amenities can generate economic benefits with no linkage to recreation activities at all. Improving habitat for sensitive species, for example, can reduce risks of regulatory restrictions on activities harmful to the habitat. Sustaining the ecosystem's ability to provide valuable services can allow a community to avoid the higher costs of providing the services through other means. Curtailing wasteful practices harmful to the environment often can allow farmers to realize higher net earnings.

All of these benefits, not just recreation expenditures, are important.

#6. Exploit complementarities. Protecting, enhancing, and capitalizing on Nebraska's natural-resource amenities will require changes in attitudes and behavior, for sure, but these changes need not come as a bitter pill; there almost certainly will be ways to sweeten the medicine. Indeed, experience in Nebraska and elsewhere indicates there probably are numerous win-win opportunities to be exploited.

Most Nebraskans see the value to themselves of the quality of life they enjoy by living where they do. Family incomes are important to them, sure, but they don't make decisions solely for the bottom line. Farmers in the Rainwater Basin, for example, have demonstrated a willingness to incur costs to promote bird migrations through the area, seeing their actions as a contribution to their quality of life. Ranchers in the Sandhills have taken similar steps to protect birds and other wildlife, for similar reasons. In this context, landowners may not be averse to taking steps that would enhance the quality of life for others, especially if they see that doing so will increase their own quality of life. Even better, they are likely to support actions that broadly enhance the quality of life for others and themselves if doing so also gives them more robust prospects for future jobs and income.

Both the public and private sectors will play a role in any serious effort to protect, enhance, and capitalize on natural-resource amenities. Neither can successfully go it alone. Win-win outcomes would benefit both sectors. Most of the state's resources are under private control; the public sector controls some key resources, has the ability to develop important infrastructure, and possesses regulatory responsibilities and authority. It

also has an extensive statewide plan for outdoor recreation, the *Statewide Comprehensive Outdoor Recreation Plan (SCORP).* This plan provides some useful background for our discussion of amenity-driven growth by describing the growing demand for recreation in the state and identifying the state's existing recreational sites and facilities. It also discusses factors that affect the supply of and demand for recreational activities, such as the public's current awareness of existing recreational opportunities and the influence of public and private programs to disseminate information regarding these opportunities to landowners, recreationists, and the general public.

#7. The sky will not fall. Deviating from a path that has for so long emphasized using natural resources to produce commodities can be scary for some. As other states and communities considered deviating from such paths, they prompted fearful predictions that the economic sky would fall. The predictions never came true. As we explain above, the economic forces and trends associated with amenity-driven growth are powerful now and likely to become more so in the future. Nebraska lags behind other states in its efforts to capitalize on these forces and trends. As a consequence, they currently work to the state's disadvantage. No alternative economic-development strategy holds as much promise as one that would lessen, if not correct, this disadvantage.

This is not to say that the steps necessary to protect, enhance, and capitalize on the state's natural-resource amenities will have no costs, problems, or difficulties. Instead, we believe the evidence shows that, because the forces underlying amenity-driven growth are so powerful, any alternative approach to the management of the state's natural resources that ignores these forces probably will have even greater costs, problems, and difficulties.

VI. EXAMPLES OF NEBRASKA'S NATURAL-RESOURCE AMENITIES

SUMMARY

As we assembled the preceding sections of this report we frequently talked with people, inside Nebraska and out, who expressed ignorance of the state's natural-resource amenities, or, worse, doubt that the state possesses any worth mentioning. We believe these views do not accurately reflect Nebraska's natural resources. Accordingly, we finish with several brief highlights of some of the notable amenities that, if managed appropriately, may have sufficient economic power to generate amenity-driven growth. These highlights are just that. We offer them as a brief introduction to some of the state's natural-resource amenities. They are not intended to be exhaustive either in their description of individual amenities or in their coverage of the state's full set of significant natural-resource amenities.

We begin with three highlights concerning the Missouri River. The first illustrates the legacy of past river-management decisions, which leave nearby residents more aware of the river's disamenities than of its ability to provide amenities. As result, few see the potential for amenity-oriented management of the river to generate economic growth. The other two, however, show that steps are being taken to reverse this state of affairs: the City of Omaha has stimulated investment by improving access to waterfront amenities, and a regional effort is underway to develop a Missouri River bike trail that potentially could become a world-class destination.

The other highlights focus on other natural-resource amenities dispersed throughout the state:

- *Boyer Chute and Fort Niobrara National Wildlife Refuges*
- *The Valentine Area*
- *The Ponca State Park Area*
- *The Pine Ridge Region*
- *Middle Platte River Wildlife*
- *Wetlands*
- *Lake McConaughy*

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Nebraska's Natural-Resource Amenities

Missouri River: Unrealized Potential

About a decade ago, the U.S. Army Corps of Engineers surveyed residents to gather information about how people use and perceive the Missouri River in the Omaha, Nebraska, and Council Bluffs, Iowa, area.[a]

- One-third of the area's adult residents had used/visited the river within the past year. They typically perceived the river as a recreation site, a nice place to enjoy water activities, a natural resource, and a place for wildlife. Slightly under one-half of them reported things they particularly disliked about the river, especially water pollution and degraded water quality. Those who used the river in the past year suggested these key actions to improve recreational use and enjoyment of the river: improve water quality; increase public safety and security; and improve the natural character of riverbanks for vegetation and wildlife.
- Two-thirds of the area's residents had not visited the river. They widely associated the river with these problems: garbage dumping on the shore and in the water; water pollution; murky water; unpleasant odor. This group identified these actions as "very important" for improving recreational use and enjoyment of the river: increase public safety and security; improve water quality; develop trails and picnic facilities for shore-based recreation.

The National Park Service conducted several focus groups (Omaha and Blair, Nebraska, and Council Bluffs, Iowa) to acquire more detailed insight into residents' perceptions.

- People from both sides of the river failed to see the river as an asset capable of generating future growth.
- Almost everyone said he or she visited the river infrequently or not at all because it was too dirty, the water was dangerous because it moved swiftly, it contained too much debris, and was not accessible.
- Residents were proud of the river's role in American history, and believed this role helped make their home unique.
- Residents generally believed the river could contribute little to the economy. No one thought that improving access to the river or developing the river banks would generate many new jobs.

These views illustrate several themes we offer in the preceding sections of this report. In the Missouri River, Nebraska has a natural resource capable of providing amenities of statewide, national, even global significance. Currently, though, the river is managed for other objectives, and for many, perhaps most, the river's disamenities overshadow its amenities. Local residents generally do not see the potential economic advantages of incorporating the river's management into a strategy of promoting amenity-driven growth. As long as this state of affairs persists, the river is likely to have a negative, not positive, effect on amenity-driven growth in the state.

[a] U.S. Army Corps of Engineers, Chicago District, Planning Division. 1995. *Telephone Survey Research Study in Support of the "Back to the River" Project.*

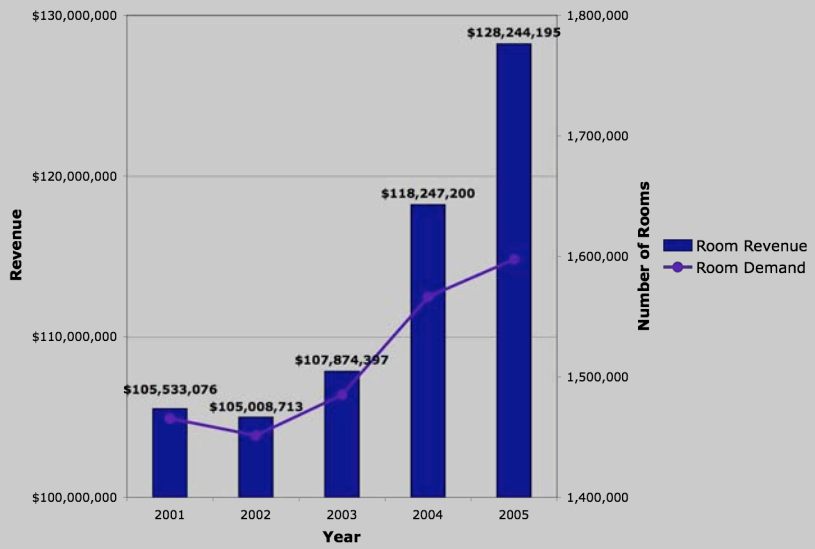
Nebraska's Natural-Resource Amenities

Missouri River Basin: Omaha's Riverfront

Ten years ago, Omaha's riverfront was dominated by a decaying industrial zone and lands tainted with hazardous waste. After clearing and capping the hazardous-waste site, the city established visual and physical access to the riverfront, creating a powerful amenity at the urban center that has attracted city residents, visitors, investment, and economic activity. New private and public investment in the riverfront area, totaling $2 billion, has generated hundreds of new jobs.

This renaissance is similar to those that have accompanied the development of attractive, accessible waterfronts in other cities, from Boston to Boise, and San Antonio to Seattle. It shows that Nebraskans can generate amenity-driven growth, when they recognize the benefits that can come from managing natural resources to provide amenities for consumers and rapidly growing new industries.[a]

The economic impact of the Riverfront development is yet to be determined but its magnitude can be inferred from trends such as those of hotel revenues in Douglas County.[b]



Below are statements of officials in Omaha commenting on the importance of the Riverfront development:

"With this project Omaha will join a growing list of truly progressive cities, ready to embrace the idea that a downtown succeeds when it becomes, not just a place to work or visit, but a place to live." Ross Robb of Omaha Riverfront Development Associates, referring to the announcement of a proposal to construct the $35 million "Riverfront Place." November 5, 2003.

"A welcoming environment is key to a thriving downtown economy." David Brown, CEO and president of the Greater Omaha Chamber of Commerce, recognizing that opportunities for downtown living, like 'Riverfront Place,' enhance Omaha's ability to attract new business.

"Gallup attracts thousands of business leaders to its Gallup University leadership training every year, and now they are coming to Omaha. Some of the visitors getting their first glimpse of Omaha will be influential company CEOs from other states and countries. When they see Omaha's impressive growth along the riverfront and downtown, they may consider Omaha as a location for their own business expansion." Roger Sorenson, Omaha Public Power District.

[a] Personal communication, Jennifer Mahlendorf, Office of the Mayor, City of Omaha.

[b] Greater Omaha Convention & Visitors Bureau. "Douglas County Hotel Demand and Revenue: 2001-2005."

Nebraska's Natural-Resource Amenities

Missouri River Basin: Trails

The "Back to the River" project was initiated by former Nebraska senator Bob Kerrey, and is part of a movement that tries to revive Nebraskans' awareness of the Missouri River's amenities and values.

The project has two main components: extending an existing bike trail beyond the Omaha city limits from, and building a pedestrian bridge across the Missouri River, connecting Omaha to Council Bluffs. Some have a larger vision: a trail network extending on both sides of the river, from Omaha to Sioux City, creating a world-class destination for biking, hiking, and related activities.

WOODMEN
WOODMEN

Nebraska's Natural-Resource Amenities

Boyer Chute and Fort Niobrara National Wildlife Refuges

Boyer Chute NWR, with 3,350 acres of floodplain woodland, tallgrass prairie, and wetland habitats, was established to help offset the loss of more than 500,000 acres of floodplain habitat along the lower Missouri River. In 2003, it received 22,044 visits, primarily for hiking nature trails. Other activities included biking, picnicking, and cross-country skiing. Recreational visitors spent $123,000 in FY 2004. Located only 25 miles from Omaha, it is no surprise that 90 percent of its visitors resided locally. Until recently, however, access to Boyer Chute NWR had been difficult, but, with the completion of improved automobile and bike access, recreational visitation is expected to increase, perhaps, markedly.

Fort Niobrara NWR contains 19,131 acres located along the Niobrara River near the City of Valentine. It protects representatives of several ecosystems: sandhills prairie, mixed prairie, Rocky Mountain coniferous forest, eastern deciduous forest, and northern boreal forest. It offers opportunities for viewing 225 species of birds including bald and golden eagles, 13 species of mammals, including buffalo and elk, and a prairie dog town covering more than 100 acres. The refuge also provides public access for persons seeking to float on the Niobrara River. In 2004 it received 207,069 visits from 95,000 individuals. With few exceptions, all visits were for non-consumptive recreational activities, such as wildlife-viewing or river-related recreation. Visit-related expenditures totaled $3.9 million.

These refuges probably are capable of generating an even greater impact on local and state economies. Support for this conclusion comes from several sources. Although adjacent to the Omaha urban area, visitation to Boyer Chute Refuge has been limited by poor access, which is being improved. Improved access should raise visitation, expenditures, and consumer's surplus generated by the refuges. Expenditures by recreationists visiting these two refuges currently fall short of the average expenditures by recreationists visiting national wildlife refuges in the region containing Nebraska and nearby states. The data in this table show the levels of expenditures that would occur if these two refuges matched the average for all refuges in the region

Average Expenditures per Person per Day in 2004 at National Wildlife Refuges in the Region[a]

	Non-Consumptive		Big-Game Hunting		Small-Game Hunting		Migratory Waterfowl Hunting		Freshwater Fishing	
	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident	Resident	Non-resident
Lodging	$2.01	$23.55	$1.56	$17.19	$0.86	$14.38	$0.29	$10.02	$1.23	$18.38
Food	$5.57	$24.20	$12.33	$28.09	$7.40	$19.94	$5.52	$25.90	$7.68	$23.32
Transp.	$5.56	$22.88	$11.40	$33.43	$9.13	$26.40	$7.26	$15.78	$7.03	$23.68
Other	$1.34	$2.89	$2.42	$62.69	$1.24	$9.79	$1.59	$3.10	$5.25	$7.71
Total	$14.48	$73.52	$27.70	$141.40	$18.63	$70.51	$14.66	$54.80	$21.20	$73.10

Source: Caudill, J. and E. Henderson. 2005. *Banking on Nature 2004: The Economic Benefits to Local Communities of National Wildlife Refuge Visitation*. U.S. Fish and Wildlife Service, Division of Economics. September. p. 429. http://www.fws.gov/refuges/policyMakers/pdfs/BankingOnNature_2004_finalt.pdf (accessed December 21, 2005)

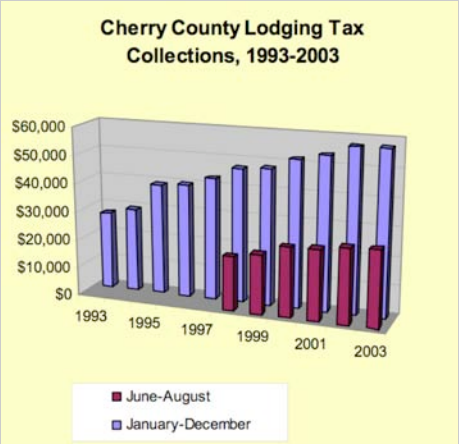
[a] Data for refuges in a region containing Colorado, Kansas, Montana, North Dakota, Nebraska, South Dakota, Utah, and Wyoming.

Nebraska's Natural-Resource Amenities

The Valentine Area

The City of Valentine benefits economically from its proximity to several important amenities: the Niobrara National Scenic River (54,385 visitors in 2004), the Valentine and Fort Niobrara National Wildlife Refuges (40,000 and 120,000 visitors, respectively, in 2004), Smith Falls State Park (73,421 visitors in 2004), Merritt Reservoir, the Sandhills, and the Samuel R. McKelvie National Forest.[a] In 2001, 96 percent of the visitors of the Niobrara Scenic River came from outside the local area.[b] The influx of visitors supports the local tourism industry that includes restaurants, motels, souvenir shops, and a network of outfitters.[c] Amenity-driven growth has offset some, perhaps all of the contraction and stagnation in other economic sectors. "The district's economy is strongly tied to agriculture, with both rural and urban income linked to farming and/or ranching [but recently] tourism and outdoor recreation has become an important secondary industry and an additional source of income in the area. The construction of Merritt Reservoir and increased publicity of the Niobrara Scenic River has helped bring thousands of outdoor enthusiasts to the area."

The impact of increased visitor traffic is indicated by lodging-tax receipts, which have been growing steadily in Cherry County, as this graph shows.[d]



The community's attractive character, plus its proximity to diverse amenities—many of which are publicly owned and, hence readily accessible—cause Valentine to resemble other areas in the western states before they became destination resorts and recreation centers. The Niobrara National Scenic River exhibits diverse landscapes and topography (wide valleys, steep canyons and waterfalls), a diverse mix of flora and fauna from five ecosystems, and many consider the Niobrara to be one of the country's top canoeing rivers. The Samuel R. McKelvie National Forest offers public-land recreational opportunities that could complement potential development of nearby housing and resort facilities. Local opportunities for wildlife-watching, fishing, and hunting support recreational activities that have long been important in Nebraska.

Valentine's remoteness from urban settings is both a blessing and a curse: it attracts tourists who come to enjoy the area's natural amenities, but deters people who want easy access to urban amenities. As the area's amenities become better developed and known, more people will be willing to incur the travel costs to reach this area. Efforts to improve road and air access could lower travel costs that dissuade some potential visitors.

[a] Visitation data from Nebraska Department of Economic Development..

[b] Davenport, M., K.M. Flitsch, J. Thompson, D.H. Anderson. 2002. *2001 Niobrara National Scenic River Visitor Study: Final Report.* Niobrara National Scenic Park, National Park Service and University of Minnesota, Cooperative Park Studies Program. September.

[c] U.S. Fish and Wildlife Service. 1999. *Fort Niobrara National Wildlife Refuge: Comprehensive Conservation Plan.* September, p. 11.

[d] U.S. Fish and Wildlife Service. 2005. *Fort Niobrara National Wildlife Refuge: River Recreation Management Plan.* January.

Nebraska's Natural-Resource Amenities

The Ponca State Park Area

Ponca State Park covers almost 1,400 acres of forested hills and wetlands along the Missouri River in northeastern Nebraska. The park marks the starting point of a 59-mile segment of the Missouri River that was designated wild and scenic by the U.S. Army Corps of Engineers in 1978. This feature of the river, along with other amenities, such as 20 miles of hiking trails, a swimming pool, campgrounds, cabins, attracted more than 600,000 visitors in 2005, including 180,000 out-of-state visitors.[a] Visitation has grown steadily for the past five years and managers expect the growth to continue.

Visitors generally engage in outdoor activities at levels similar to those experienced at major parks elsewhere in the U.S., but with a greater incidence of camping and horseback riding.[b] In 1998, 71 percent of the visitors to Ponca State Park camped and 33 percent rode horses, compared to 27 percent and 7 percent, respectively, for the U.S. as a whole. Visitors to Ponca State park are more than twice as likely to spend up to a week in the park, when compared to the visitors in Nebraska's other state parks. The experience of many is enhanced by the newly constructed Missouri National Recreation River Resource and Education Center, which includes an interpretive component and group conference facilities.

Together with adjacent federal lands, Ponca State Park provides a large and distinctive unit of publicly owned land that potentially could become the focal point for private investment seeking to capitalize on the land's amenities. Some development has begun, with new, upscale housing and a golf course appearing along the park's borders. Other types of investment, in lodging, restaurants, and gift shops, lag far behind, but they probably will begin to catch up if more households, seeking to live near the park and nearby amenities, continue to stimulate housing development. The community conceivably could emerge as a significant recreational, residential, and retirement community, building on its proximity to the park and adjacent amenities.

Ponca State Park attracts substantial funds to support its efforts to conserve resources and provide recreational and educational experiences for visitors. In 2005, for example, the Nebraska Environmental Trust awarded the park $200,000 to restore 102 acres of wetland.

Many outdoor-recreation guides describe Ponca State Park in terms, such as these:

- Some of the best views in the region.
- The eastern terminus for people taking float trips through the Missouri National Recreational River.
- A bird watching paradise and in the fall a kaleidoscope of colors from the autumn leaves.
- Nebraska's premier state park for outdoor educational opportunities, programs and activities.

John Kingsbury, President of the Bank of Dixon County and the Better Ponca Foundation states, "Changes are beginning to take place as more business-minded people see the opportunities. Adjusting business outlook from what was formally a rural ag mentality to the needs of today's park visitor is a big step. … Our first goal was to create a unique experience based around outdoor education and promotion of the Missouri National Recreational River region as a national destination. That awareness is building. … We are also seeing an increase in new housing. Families today are looking for communities that offer natural beauty and outdoor recreation opportunities."

[a] Nebraska Department of Economic Development. 2006. *2005 Attraction Attendance*. Lincoln.

[b] Hanson, M.A. 1999. *Ponca State Park Visitors' Survey*. University of Nebraska – Lincoln.

Nebraska's Natural-Resource Amenities

The Pine Ridge Region

The Pine Ridge region stretches over more than 100 miles in northwest Nebraska. The region exhibits characteristics not normally associated with Nebraska: dense stands of Ponderosa pine, high elevation, dramatic landforms, spring-fed streams and creeks, and spectacular panoramas and overlooks.[a] It also includes a significant portion of the state's public lands: the Pine Ridge District of the Nebraska National Forest, the Oglala National Grasslands, Chadron State Park, and Fort Robinson State Park.

Visitors to Selected Attractions in the Pine Ridge Area in 2004[b]

Attraction	Number of Visitors
Fort Robinson State Park	352,064
Chadron State Park	205,655
Nebraska National Forest – Pine Ridge District	28,435
Soldier Creek Wilderness Area	10,293
Pine Ridge National Recreation Area	2,496
Oglala National Grassland	n/a
Hudson-Meng Bison Bonebed	2,600
Toadstool Geological Park	10,446

Local farmers have been successful in drawing people from Nebraska and outside, who are interested in agritourism. For example, the Northwest Nebraska High Country Association of farmers and ranchers offers lodging, hunting, and outdoor recreation on their properties located in the Pine Ridge area.[c]

[a] Collins, M. 2004. *2004 Nebraska Tourism Industry Development Plan*. Nebraska Travel and Tourism Division.

[b] Nebraska Department of Economic Development. 2005. *Attendance at Selected Nebraska Attractions.* http://info.neded.org/stathand/msect4c.htm (accessed December 19, 2005).

[c] Northwest Nebraska High Country. http://www.nebraskahighcountry.com (accessed January 26, 2005).

Nebraska's Natural-Resource Amenities

Middle Platte River Wildlife

A 1996 survey of visitors who came to the Middle Platte River area to watch birds during the migration of Sandhill and Whooping cranes found the average party consisted of more than 5 individuals who stayed in the area for 3 days and spent $285 per person. Throughout the year, respondents to the survey averaged 3.5 trips and spent $790. These figures contrast with the overall characteristics of visitors to the state: the Nebraska Department of Economic Development estimated at the time that the average party of visitors from out of state had 2.5 persons, stayed 2.2 nights, and spent $159.

Visitors' trip-related spending on wildlife-watching trips to the area totaled $13 – $20 million in 1996. Respondents to the survey indicated that, on average, they were willing to pay an additional $193 per trip, so that the total consumer's surplus visitors enjoyed from their trips was $2.8 – $4.4 million. Thus, the survey findings indicate that, in 1996, birders placed a value of $15 – $25 million on the recreational opportunities supported by the area's wildlife, and generated total spending of about $25 – $50 million. More than 75 percent of bird-watching expenditures originated with residents of other states.[a]

The cranes' attraction receives local, national, and international attention, as evidenced by a recent article in *USA Today*, which highlighted the experience of the 3-4 week period when the cranes' presence in the reach from Lexington to near Grand Island "has people from around the world pouring into the Cornhusker state from mid-March through April."[b]

[a] Fermata Inc. 1996. *Platte River Nature Recreation Study: Executive Summary*. http://www.fermatainc.com/basic/eco_nebplatte.html (accessed November 11, 2005).

[b] "Sandhill Cranes Roost along Platte River." USA Today. April 22, 2006. http://www.usatoday.com/news/nation/2006-04-22-sandhill-cranes_x.htm (accessed April 26, 2006).

Nebraska's Natural-Resource Amenities

Wetlands

Although by 1980 it had lost 35 percent of what existed at the time of statehood, Nebraska still contained more wetlands—about 1.9 million acres, or 4 percent of the state's total area—than neighboring states: 10 percent more than South Dakota, 50 percent more than Wyoming, twice Colorado, three times Missouri, and four times Iowa and Kansas.[a]

The state's wetlands support many of the species that are distinctive of the state's ecological heritage:

Number of Species Using Nebraska's Wetlands (% of statewide total)

Plants	Amphibians	Reptiles	Birds	Mammals
990 (50%)	13 (100%)	18 (38%)	176 (50%)	29 (36%)

Further loss of wetlands could increase the risk of extirpation or extinction for some species. The increased risk could, in turn, increase political, administrative, and economic pressure to curtail all activities that might have an adverse impact on the species.

At least one study has documented the fact that Nebraskans recognize the economic value of the state's wetlands and would like to see existing wetlands protected and some lost wetlands restored. Focusing on the Rainwater Basin, a researcher at the Agricultural Research Division of the Institute of Agriculture and Natural Resources at the University of Nebraska – Lincoln surveyed households throughout the state. The results supported this conclusion: Nebraskans "positively value their state's Rainwater Basin wetland region in that they are willing to pay to have it maintained and expanded." Responses to the survey suggest that, as a whole, Nebraskans "would be willing to pay about $12 million annually for a government program to purchase and/or manage wetland areas in Nebraska's Rainwater Basin region."[b]

[a] Nebraska Game and Parks Commission. 2005. Guide to Nebraska's Wetlands and Their Conservation Needs, Second Edition. 2005.

[b] Poor, P.J. 1999. "The Value of Additional Central Flyway Wetlands: The Case of Nebraska's Rainwater Basin Wetlands." *Journal of Agricultural and Resource Economics*. 24(1): 253-265.

Nebraska's Natural-Resource Amenities

Lake McConaughy

Lake McConaughy is a reservoir on the North Platte River, near Ogallala, with a storage capacity of almost 2 million acre-feet. When full, it covers more than 30,000 acres, making it the largest body of water in Nebraska. When inflow is sufficient to keep the reservoir full, or nearly so, recreational activities can co-exist with releases of water by the reservoir's owner, the Central Nebraska Public Power and Irrigation District, to irrigate fields and generate hydropower. Over the past 25 years, though, inflows have exhibited a long-run decline, and the reservoir has been less than 50 percent full in 2002, 2003, 2004, and 2005. When water is this low, recreationists wanting water to remain in the reservoir compete with those who want it released.

The author of a recent study of these competing demands concludes that recreationists were willing to pay $14.43 per visitor-day in 2005, and would be willing to pay an additional $1.42 per visitor-day if the water level were slightly higher. If water in the reservoir were at 20 percent of capacity, the recreation benefits of adding 100,000 acre-feet would have a value of $1.4 million. The full economic consequences of leaving water in the reservoir for recreation users would depend on the specific circumstances but, under plausible scenarios, the recreation benefits of leaving water at appropriate times would exceed the losses to irrigation and hydropower interests.

As one of the largest bodies of water readily accessible to residents of the Denver area, Lake McConaughy potentially could attract many Coloradoans and generate an in-flow of revenues for Nebraskans. Visitation statistics show that the lake has this drawing power: more than half of the recreation visitors come from Colorado. The local economy, however, has not fully capitalized on the situation. Most Coloradoans arrive in recreational vehicles, having first purchased in Colorado most of the food, equipment, and other supplies they will consume during their visit. Consequently, their expenditures in Nebraska are limited, and the lake's potential impact on local retailers remains unrealized. The recent study described above found there is no demonstrable correlation between the level of visitation by residents from other states and employment in the surrounding Keith County.

Evidence accumulated by the Game and Parks Commission shows that, when water level in the reservoir falls, visitation drops and the value of nearby properties declines. Perhaps a more stable water level would make investors more confident and stimulate the creation of an infrastructure that would link the lake and the town and even create an amenity-driven economy.

Source: Supalla, R.J. 2005. *Economics of Management Options for Lake McConaughy: Executive Summary*. University of Nebraska – Lincoln, Department of Agricultural Economics. December 13.

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