

Fall 2004

Nebraska Blueprint – Fall 2004

Follow this and additional works at: <https://digitalcommons.unl.edu/engineeringblueprint>



Part of the [Engineering Commons](#)

"Nebraska Blueprint – Fall 2004" (2004). *Nebraska Blueprint (Student Publication)*. 18.
<https://digitalcommons.unl.edu/engineeringblueprint/18>

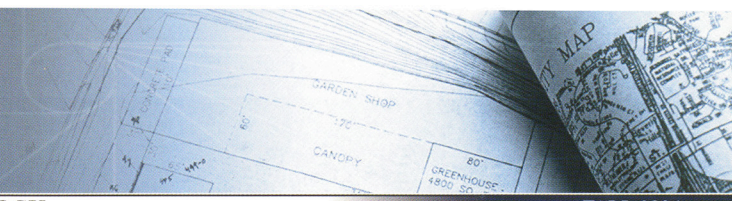
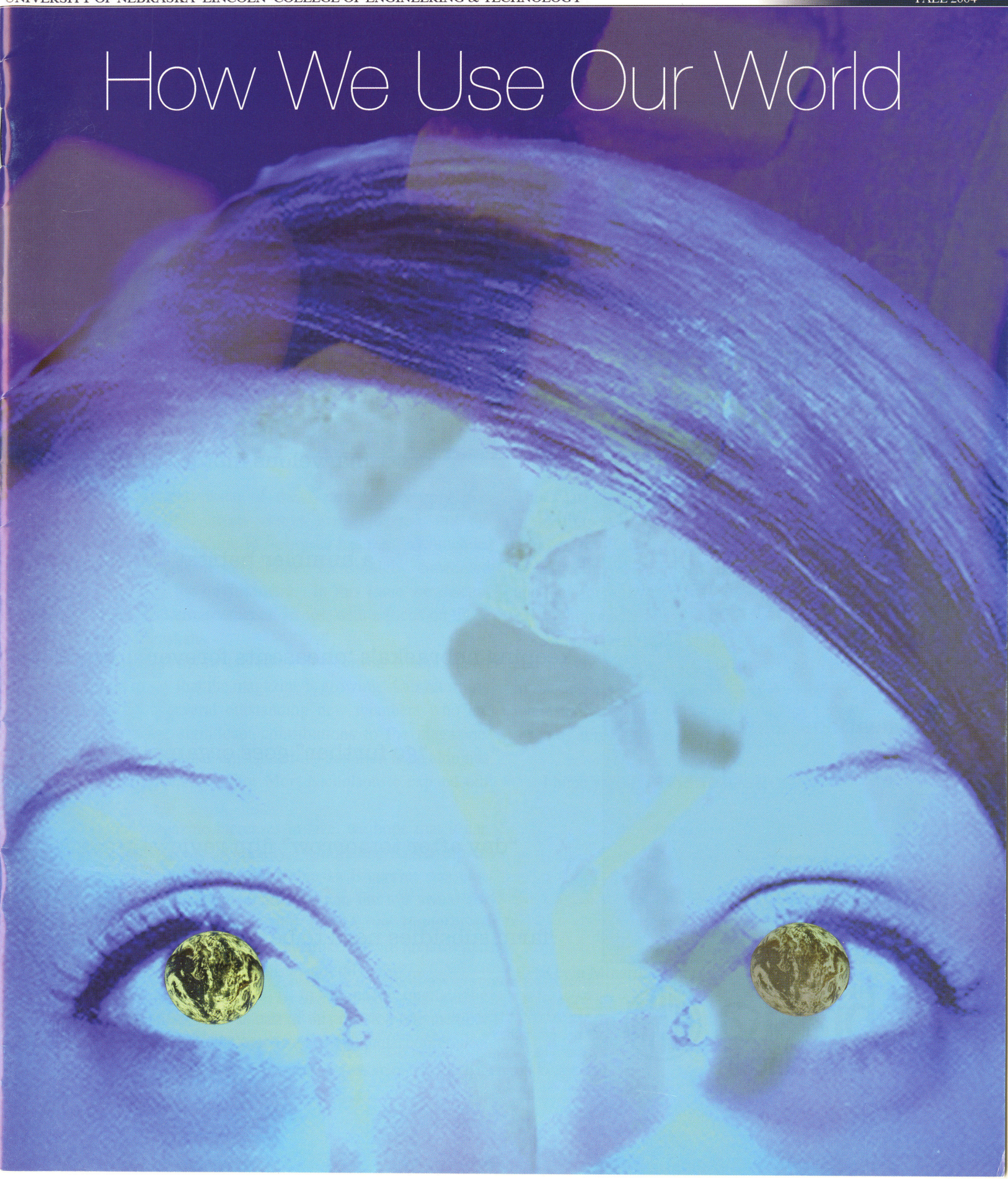
This Article is brought to you for free and open access by the Engineering, College of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Blueprint (Student Publication) by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

BLUEPRINT

UNIVERSITY OF NEBRASKA-LINCOLN COLLEGE OF ENGINEERING & TECHNOLOGY

FALL 2004

How We Use Our World





STAFF

[editor]	kevin mlnarik
[assistant editor]	elizabeth shanahan
[layout editor]	angela parr
[writers]	brian hernandez cecelia orwig hilary swanson sheeri weyers
[cover design]	sheeri weyers
[adviser]	roxane gay
[publications board]	john ballard constance walter

a green house effect | orwig

a crumby deal | orwig

a river runs through it | swanson

the experts tell all | mlnarik

what is environmental engineering? | hernandez

marvelous motors | mlnarik

a humbler habitat | swanson

keeping nebraska's 'pheasants forever' | orwig

"go further" goes organic | weyers

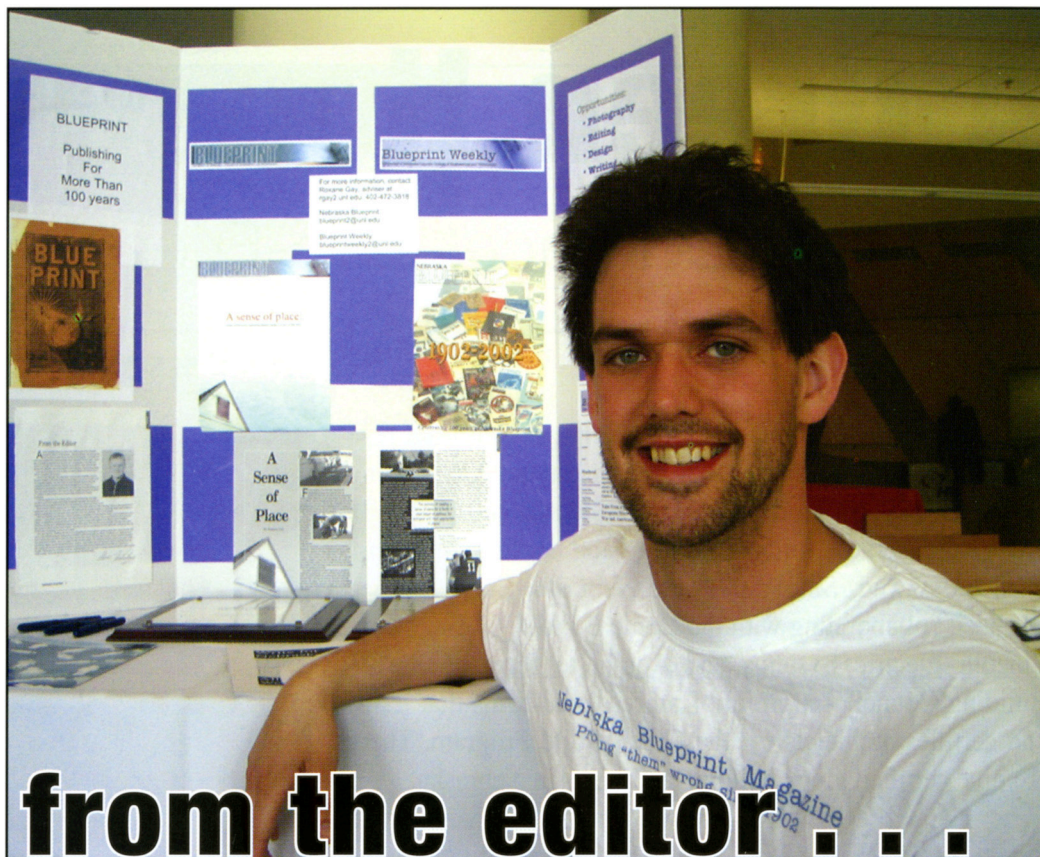
"day after tomorrow" film review | weyers

farm subsidies need to be reformed | mlnarik

4
6
8
10
12
14
16
18
20
22
23



The Nebraska Blueprint is produced by students for the University of Nebraska-Lincoln College of Engineering & Technology and is published twice each year. Reprint permission granted if requested prior to publication. Reprint requests and reader contributions in the form of letters, articles, photography or original artwork should be addressed to Nebraska Blueprint, 114 Othmer Hall, Nebraska 68588-0642; telephone 402-472-3818; fax 402-472-7792. The University of Nebraska does not discriminate in its academic programs.



A letter from the editor ■ ■ ■

Since the first issue of the Nebraska Blueprint was published in 1902, many things have changed, but the importance of agriculture in Nebraska has not. Meanwhile, many Nebraskans have become increasingly concerned with protecting the environment. In this issue we discuss agricultural and environmental issues, with a focus on those affecting Nebraskans.

This issue is my first as editor of Nebraska Blueprint and I'm proud to say that the magazine is growing. Our returning staff recruited several outstanding new members who are already making significant contributions to the magazine. The enlarged staff is using a generous donation from alumnus and former Blueprint editor Mort Nicholson to expand our magazine.

As our magazine increases in size, we hope that it can continue to increase in quality. Under the leadership of former editor Tom Cudd, the Nebraska Blueprint was able to beat out 16 other universities to win the top award for publication improvement at the ECMA, or Engineering College Magazines Associated, awards. We are hopeful that we will again be able to win this award this year.

ECMA's stated purpose is to "improve engineering college journalism," and as part of this mission one member university is selected each year to host their annual conference.

This year, members of Nebraska Blueprint have the honor of hosting the conference, and we are currently inviting speakers to the event, which will be held April 7-9, 2005. We are expecting about 50 attendees at the three-day conference and look forward to showing other engineering colleges how we do things here in Nebraska.

Nebraska Blueprint is always looking for new members, and we are also seeking advertisers and alumni interested in making a financial contribution to the magazine. Anyone interested in joining our staff or making a contribution can reach us at rgay2@unl.edu.

I hope you enjoy the magazine,

Kevin Mlnarik, editor

A Green House Effect

Nebraska Embraces Eco-Friendly Construction

by Cecelia Orwig

From 1970 to 2000, electricity bills in Nebraska rose more than \$460 million dollars, with natural gas soaring more than \$220 million dollars for residential consumers. In order to preserve affordable heating and cooling, this trend must be slowed. Since 2000, the Nebraska Energy Office has been collaborating with the Home Builder's Association, Lincoln Electric Systems and Aquila to form the Green Building Council – a group of professional firms that trains and certifies architects for the Green Build Program. There are nine certified green building architects in Nebraska.

What is green building? According to Lynn Chamberlain, architect for the Energy Office Administration of the Nebraska Green Build Program, it is “a type of residential building, which took over a year to develop the new codes and standards for.” Green built homes using recycled materials and exact supply orders to reduce construction waste products and make heating and cooling of a residence more efficient.

Currently there are three green-built homes in Lincoln and all were displayed in the 2003 Parade of Homes. Each home was at least 50 percent above building code and had central air and gas furnaces. The energy bills in these homes were up to \$400 less per year than in average non-green-built homes of the same square footage.

One of the architects who helped to design the test is Avery Schwer, a University of Nebraska-Lincoln professor of construction systems. Schwer spoke about the impact green building would have on communities. “This form of construction allows for energy efficiency that reflects really low energy bills. We research for (building) materials, usually at Menards or Lowes, looking for sustainability and harvested lumber, which includes hand selected trees. Everything gets careful consideration,” Schwer said.

Schwer teaches students who must go through a service learning exercise each year, which includes designing a home for Habitat for Humanity. This home is chosen for a specific family and often has unique specifications. Generally, these homes are very simple, with no basement and concrete paneled walls. The one currently in the design phase is being



The Green Build Program builds homes using recycled materials and exact supply orders to reduce construction waste products. (below) As one of the three green-built homes in Lincoln, Neb., this house was displayed in the 2003 Parade of Homes.





"This form of construction allows for energy efficiency that reflects really low energy bills . . . Everything gets careful consideration."

Avery Schwer

funded through Gesu Housing Inc., a non-profit housing establishment that builds homes in low income areas. This home will have a basement and a porch and will use concrete paneled walls. The students look forward to meeting the new codes set up by the Nebraska Energy Office in January, when construction begins for the Gesu home.

Schwer is excited about the green building's goal of fitting in with the landscape rather than trying to set itself apart. "Frank Lloyd Wright was a pioneer of this. Prairie home construction is intentionally designed to merge with the landscape. This includes using natural materials in building construction," Schwer said. Schwer also said she encourages the use of local materials to reduce the use of petroleum for shipment of materials.

Green building also makes homes healthier. The homes feature "windows that work," which have the capability to open and close at will – to allow for maximum light ventilation and air exchange. Low volatile organic compound (VOC) paints and varnishes help inhabitants avoid the headaches and health problems that arise from high VOC products. Insulation in the attic and walls can be evenly distributed, making sure it fills all holes, cracks, and voids so that heat performance is maximized, and energy bills minimized.

The program is an opportunity for architects and constructors to show support for the cutting-edge of their profession. Right now is the golden age of research in this field. Residential areas, as well as commercial communities, have the ability to contribute to the popularity of this environmentally and economically sound program.



Lynn Chamberlain, an architect for the Energy Office Administration of the Nebraska Green Build Program, said the Green Build Programs built homes using recycled materials.





A *Tires are piling up in landfills, so researchers are presenting new ways to recycle the rubber*

CRUMBY DEAL

by Cecelia Orwig

There was once a time when old tire landfills dotted the landscape. Ditches were filled with illegal stockpiles of worn out tires and trees hid millions of rubber donuts. Each year, around 273 million tires are sent to landfills, causing unsightly landscape eyesores and inducing the burning of tires that releases toxic fumes into the atmosphere.

Because of these downfalls, government agencies began researching different uses for this abundant and unlikely resource. This brand of research began in the 1940s, when the U.S. Government formed the U.S. Rubber Reclaiming Company. This company was the first to sell a recycled rubber product called Ramflex as a dry particle additive to asphalt paving mixture. In the mid-1960s, Charles McDonald, an engineer for the U.S. Rubber Reclaiming Company, developed an asphalt binder using crumb rubber. His binder was marketed as Overflex. At the same time – in Sweden – contributions were also being made toward the development of rubberized asphalt. Two Swedish companies



Although people have found alternative uses for unnecessary tires, (above) the U.S. Rubber Reclaiming Company has developed new ways to recycle the abundance of tires due to their many negative effects (top).



developed an asphalt mixture that was able to resist studded tire and chain wear.

These paving mixtures could not make use of all tire scraps which were being produced world-wide. Developers of children's playgrounds came up with a plan to use tire rubber crumbs in place of wood chips and gravel as groundcover. This use had the added benefit of protecting not only the ground, but knees as well.

Alternative uses of recycled tires also include athletic surfaces such as turf insulation and stadium tracks. The University of Nebraska–Lincoln recently made its contribution to tire recycling with its purchase of tire-crumb turf for the new Cather Pound Neihardt recreational fields. These fields are covered with synthetic grass that is filled with tire crumb. UNL students play a variety of sports on these fields. When asked what he thought of the tire crumb turf, Brandon Todd, a junior computer engineering major said, "There's more spring to it, I think. This makes it easier for me to run." Todd did, however, have some minor complaints about this new turf.

"It's just not the real thing. It doesn't feel right. I'm sure it costs less for upkeep, in that the University doesn't have to water or mow it. Overall, it was a good economic choice, and its not going to make the sports less enjoyable."

There are many other uses for tire crumbs. They can be molded into high-volume/low-tech products, such as livestock mats, removable speed bumps, railroad ties and

acoustic insulation for cars. Tire chips can be used as fill for embankments and retaining walls, drainage material, daily cover at solid waste landfills, or an insulating layer beneath roads. The chips are an improvement over traditional materials because they are not as dense, easier to install, provide better drainage, and better thermal insulation.

In addition to crumbing and chipping, nearly 8 million waste tires are cut, stamped, or punched into hundreds of consumer products, each year.

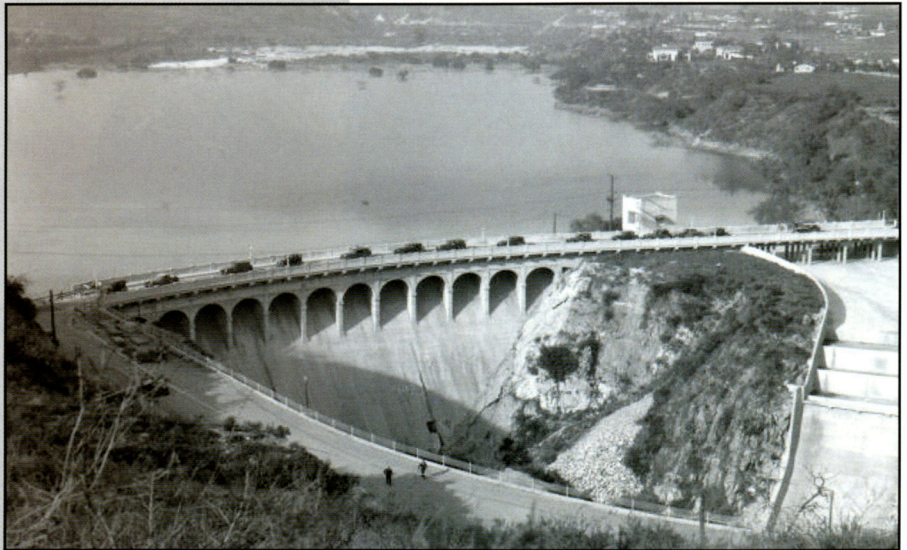
The largest user of scrap tire waste is the energy industry. Millions of tires are used annually to produce energy for industrial areas in the Northeastern region of the U.S. Though this is not the most efficient way to use the tires, because a great deal of energy is lost during the heating process, the energy industry goes through more tires than any other recycling industry. Work is currently being done by these agencies to reduce toxic emissions. While current emissions are within government regulations, a better way to break down the tires must be found.

Until effective laws are created for the regulation of waste tire disposal,

citizens will discard the tires in whichever way they see fit. Perhaps someday every family will have a playground with tire-crumb ground cover and every high school will have a tire-asphalt track with tire-crumb turf. Until that day, researchers will continue to find better alternatives for this abundant resource.

"There's more
spring
to it . . .
This [tire crumb]
makes it
easier
for me to run."

Brandon Todd



A River Runs Through It

by Hilary Swanson

Ever since the 19th century, the U.S. Army Corps of Engineers has engineered a number of projects on our nation's waterways that have improved inland transportation and controlled flood damage. On the Missouri River, the Corps's projects have often been met with varying degrees of enthusiasm.

The Pick-Sloan Missouri Basin program was initiated by the Flood Control Act of 1944 and authorized the U.S. Army Corps of Engineers to construct hydropower dams on the upper Missouri River to enhance flood control, navigation, irrigation, recreation and power generation, according to the Western Area Power Administration.

Today, six dams constructed between Fort Peck, Montana, and Yankton, South Dakota, have turned the river into the largest reservoir system in North America. These reservoirs manage the volume of the river's flow, capturing the spring's high flows and releasing water to supplement lower flows during the late summer and fall.

Much debate has emerged over the Corps's management of flow discharge in recent years, especially during times of drought. Adequate water retention is needed for irrigation and recreational uses of the reservoirs but downstream from the dams, a certain discharge is required to maintain barge navigation, drinking water and enough cooling water for power generation.

"In Nebraska, one of the main things the river is used for is cooling water," said David Admiraal, a civil engineering professor at the University

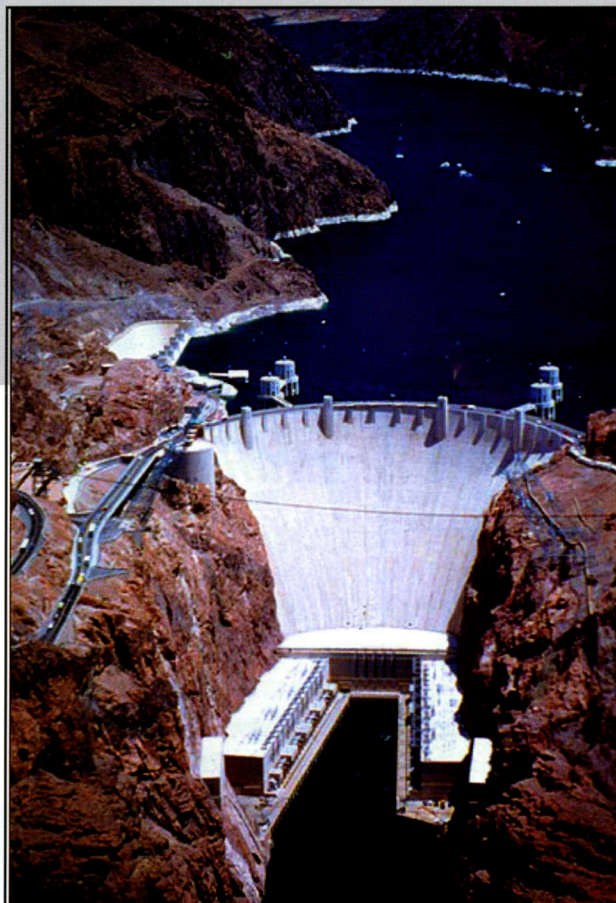
of Nebraska-Lincoln. “If the summer flow rates fall, power plants along the river may not be able to take in enough water to maintain cooling, which is necessary to comply with thermal effluent standards.” Resulting higher water temperatures can adversely affect the river ecosystems – many fish, for example, can only spawn in a limited range of water temperatures.

The protection of ecosystems along the river is also a major concern. Since 1990, environmental protection – along with flood control and navigation – has been made a primary mission in the Corps’s water resources projects. Reservoir creations along the upper river and channelization of the lower river have challenged the viability of fish and bird species that once thrived on a free-flowing river.

The pallid sturgeon is an example. The first Missouri River fish species to acquire federal protection under the Endangered Species Act, the sturgeon’s decline is likely a result of alterations in its native habitat. Movements upstream to spawn are now prevented by dams and the narrowed river channel downstream has eliminated much of the sturgeon’s floodplain habitat.

The Army Corps of Engineers has made progress in restoring original wildlife habitats along the lower river in recent years – 666,750 acres have been acquired to restore habitat lost to previous channelization operations on the river. Working with the Nebraska Game and Parks as well as state agencies from Kansas, Missouri, and Iowa, this mitigation project seeks to replace nearly a third of the river habitat lost to channelization.

More information on this topic can be found at the U.S. Army Corps of Engineers Web site at <http://www.usace.army.mil>.



Dams, (other page) such as the Hoover Dam, (top) have turned the Missouri River into the largest reservoir system in North America. (above) Flood control has been a primary concern for the U.S. Army Corps.

How is Ethanol Made?

It takes more than a plant to whip up what fuels our cars and also fills our bellies

by Kevin Mlnarik

Ten thousand years ago humans learned to create ethanol from grain. These early humans weren't making a fuel alternative; they were making beer. The alcohol in beer and the ethanol in your gas tank are two names for the same chemical.

Early humans found that wet grain would produce alcohol if stored in a tightly closed container. Modern biologists and chemists have discovered that yeasts are responsible for this process. These yeasts thrive in environments without oxygen. They eat carbohydrates in the grain, and produce carbon dioxide and alcohol as waste.

Manufacturers still use grain and yeast to make ethanol. According to Hossein Nouredini, University of Nebraska-Lincoln associate professor of chemical engineering, the grain most commonly used today is corn – but a variety of grains can be used to produce ethanol. He says corn is used because it is widely available, relatively cheap and manufacturers get generous government subsidies for using it.

After the corn arrives at the ethanol plant, it is ground by mills and soaked with water. This soggy substance – called mash – is then heated to about 130 degrees Celsius to kill any bacteria and to liquefy the mash. Next, chemicals are added to further liquefy the mash, and it is kept at about 95 C for several hours.

After the mixture is fully liquefied, enzymes are added to convert soluble starches, which yeast cannot digest, into edible sugars. Billions of specially-bred yeast are then added and

immediately go to work converting sugars into alcohol. After 48 hours of avid consumption, the yeasts have raised the level of ethanol in the mixture to about 14 percent.

This mixture – known as beer – is distilled to isolate the ethanol. In distillation, manufacturers boil the beer to turn the ethanol and water into gasses. These gasses are allowed to cool, and since ethanol has a lower boiling point than water, it condenses first. The condensed ethanol is collected, and the last traces of water are removed chemically.

At this point the ethanol, if properly diluted, would be fit for human consumption. As a result, a

small amount of gasoline is usually added to the mixture to make it toxic, and thereby deter theft during transport. The ethanol is now ready to be distributed as a fuel additive.



Ethanol, which is made with grain and yeast, is used in gasoline to fuel our vehicles.

How Do Cell Phones Work?

Cell phone networks work with towers, phone companies so you can chat on the go

by Kevin Mlnarik

Imagine for a moment that you're spending your Saturday driving through Nebraska and -- being a good Husker fan - - you want to talk to your buddies about the Cornhusker victory you just listened to on the radio. To do this you pull over to the side of the road, dial your friend's number on your cell phone and wait for her to pick up. She answers her cell phone and you discuss the latest Nebraska win.

According to UNL electrical engineering professor Lance Perez, the simple act you just envisioned involved a series of steps quickly and silently executed by your phone and the cell phone network. The call began with the cell phone towers you may have noticed along the highway. Each of these towers continuously transmits a signal to tell your phone which company is using the tower. When you turned on your phone it searched for a tower belonging to your phone company. At the same time, your phone declared that it was in the network by sending, like a tiny radio transmitter, a message containing your phone's

unique ID number. If there wasn't a nearby tower operated by your phone company, your phone would have displayed "roaming" and you would've used another company's towers. Luckily, your phone company had a tower nearby.

The towers that were able to receive your phone's ID sent this number into your phone company's central office computer to verify that you were a paying customer. Once that was established, the computer began tracking your signal. Meanwhile, it kept in touch with your phone by

exchanging short electronic messages with your phone through whatever tower received the strongest signal. If the computer noticed that your signal was stronger on another tower, then you would have been handed off to that tower. This ability to transfer calls to other towers allows you have an uninterrupted conversation even while you're switching towers.

When you dialed your friend, your phone sent a message to the tower it is assigned to by the central office computer. This message contained your phone's ID number, and the number you wanted to call. The computer finds your friend and connects you using two available channels. If there were no available

channels your phone would've displayed "network busy," but thankfully your call went through. Now you're connected to your friend and everything is fine with the world -- assuming the Huskers keep winning.



Cell phone towers work with your cell phone network so you can talk while on the road.

What is Environmental Engineering?

"Without environmental engineering, the air we breathe and water we drink would be unsafe."

Dennis Schulte

Engineers protect humans through study of health, pollution, environment

by **Brian Hernandez**

At first consideration, actors Pauly Shore and Stephen Baldwin complement environmental engineering as well as ketchup does chocolate ice cream. They simply shouldn't mix. But in the 1996 comedy "Bio-Dome," director Jason Bloom blends the actors with the concept of environmental engineering by presenting the causes of human interference and the resulting effects placed on nature.

Shore and Baldwin star as Bud and Doyle: two "losers" who get trapped in an environmental facility controlled by five scientists. The scientists are hermetically sealed in the facility for a year. Although working conditions for actual environmental engineers vary depending on their duties, the "Bio-Dome" is not as far-fetched a concept as one would think. The movie's working environment has a rain forest, desert, farmland, a lagoon, laboratories and living quarters – all the necessities modern environmental engineers need to conduct relevant studies.

But what exactly is environmental engineering and what do the people associated in this field accomplish?

Dennis Schulte, University of Nebraska-Lincoln professor of biological systems engineering, defines environmental

engineering as the application of problem-solving skills to environmental situations that have industrial, human and ecological dimensions. The major areas include air pollution control, industrial hygiene, radiation protection, hazardous waste management, toxic materials control, water supply, wastewater management, storm water management, solid waste disposal, public health and land management.

The principles of biology and chemistry help environmental engineers develop solutions to environmental problems. Engineers deal with water and air pollution control, recycling, waste disposal and public health issues. Many consider environmental engineering work a realistic occupation because it deals with practical work that is hands-on.

"Environmental engineers protect human health and the environment by designing systems," said Bruce Dvorak, UNL associate professor of civil engineering and biological systems engineering. "(They) devise strategies for preventing future contamination and devise methods for cleaning up past contamination."

The U.S. Department of labor said environmental engineers deal with local and worldwide environmental issues. They conduct hazardous-waste management studies in which



they evaluate the significance of the hazard, offer analysis on treatment and containment and develop regulations to prevent mishaps. Their studies help minimize the effects of acid rain, global warming, automobile emissions and ozone depletion.

Environmental engineers are also involved in the protection of wildlife. “Without environmental engineering, the air we breathe and water we drink would be unsafe,” Schulte said. “Because of environmental engineering, the risk of cholera, emphysema and many other diseases are greatly reduced compared to past centuries when environmental engineering did not exist.”

Environmental engineers often work at consulting firms or government agencies, such as the Environmental Protection Agency or Army Corp of Engineers, and also for city utilities, such as the Lincoln Water Department or the Metropolitan Utilities District of Omaha.

According to the Bureau’s Office of Occupational Statistics and Employment Projections, employment for environmental engineers is expected to increase 36 percent from the year 2002 to 2012. “In the U.S. and most of Europe and Canada, new challenges face environmental engineers such as the environmental effects of industrial chemicals, pharmaceuticals, and so forth,” Schulte said. “There are still places in the world, such as parts of Russia, China and Africa where environmental engineering is badly needed.”

Schulte said Nebraska has one of the leading environmental engineering programs in the country in terms of pollution prevention, water and wastewater treatment, and agricultural waste management. “UNL’s Environmental Engineering program is nationally recognized for its Pollution Prevention Internship Program, which provides hands-on experience for undergraduates in ways of preventing pollution in the first place, so that hazardous waste treatment and other environmental engineering methods are not required at all,” he said.

Nebraska does not offer a Bachelor of Science degree in environmental engineering. The university does offer, however, a master of science in environmental engineering. Classes offered include 300, 400, 800 and 900 level classes, and introductory courses include Introduction to environmental engineering and Environmental engineering laboratory. Chemical engineering professor Dr. James Hendrix also offers an air pollution course that could be considered an environmental engineering course.

Schulte said students in environmental engineering – more often than not – join the American Society of Agricultural



Gifford, an environmental engineering firm in the UK, has a team who is focused on the protection of the environment and the design of sustainable developments.

Engineers, the American Society of Civil Engineers, the Water and Environment Federation, the American Water Works Association and the Soil and Water Club. From the

basic heat transfer processes of conduction, convection and radiation to the simple fabric and ventilation heat-loss-calculations for buildings, environmental engineering is at the forefront of complexities that make people’s lives environmentally friendly.

As for “Bio-Dome,” Bud and Doyle turn the multimillion-dollar environmental research project into a travesty, destroying in a matter of weeks what had taken years to create. In an attempt to redeem the irredeemable, their characters finally see the light and learn to respect nature. And

in time, Bud and Doyle come to honor the project and its goals, and their misadventures even help to rescue the bio-dome from certain failure. They attempt to restore plant life to reproduce oxygen, and when Earth Day inevitably approaches, homeostasis is at 98 percent. In one of the final scenes, Bud said, “If only we had another day...or at least another 24 hours.” Environmental engineers will continue to lend their helping hands and guide others in the effort to preserve Mother Nature, one day or 24 hours at a time.

“These issues are of critical importance to all people, not just engineers,” Schulte said. “We need support from the public as well as industry and local, state and federal governments for a cleaner environment.”

“We need support from the public . . . for a cleaner environment.”
Dennis Schulte

Marvelous MOTORS

by Kevin Mlnarik

A University of Nebraska-Lincoln electrical engineering professor and his colleagues have found a way to decrease American dependence on foreign oil, protect the environment and save money for both families and industries. UNL visiting professor Dean Patterson said this can be done by increasing the efficiency of the millions of products that contain electric motors.

The electric motor is one of the most useful inventions ever created, but it has a dark side. Almost 60 percent of the electricity produced in the United States powers motors, but much of this power is wasted. According to Dr. Patterson, many electric motors found in everyday products, such as vacuum cleaners and blenders, are less than 50 percent efficient. That is, less than 50 percent of the energy used by these motors creates motion and the rest is wasted as heat. Large industrial motors are better, but even these are typically only 85 percent efficient.

Patterson collaborated with researchers at more than 20 institutions throughout the world to create more efficient motors by focusing on the magnets in these



motors. Motors contain two types of magnets – permanent magnets and electromagnets. Permanent magnets are the type that people stick to their refrigerators, and electromagnets require electricity.

Attraction between magnets creates the force that turns a motor's shaft. One can increase the force between the magnets by either running more electricity through the electromagnet, or by using a strong permanent magnet. Increasing the electricity through the electromagnet consumes more energy, so researchers have focused on using strong permanent magnets so that motors can generate the same power using less electricity, and thereby be more efficient. The strong permanent magnets used for this purpose are called rare earth magnets and since their discovery in 1965, they have been progressively integrated into more products.

Throughout the 1970s, the cost of a one-kilogram rare earth magnet was about \$2000, but this cost was justifiable to the aerospace industry. "A kilogram of weight is worth a million for something you send into space," Patterson said. As the cost of rare earth magnets decreased, more applications were found for them. In 1993, Patterson was involved in the World Solar Challenge, a solar powered car race across Australia. The efficiency of the rare earth magnet made it a perfect fit for the race. "In a solar car everything counts. I was looking for milli-watts of power," Patterson said. The car was sidelined due to mechanical problems not related to the motor, but the project represented another application of rare earth magnets.

"Even if all
of the country
used half
the energy
on refrigerators,
it would make
a difference —
a real difference."

Dean Patterson

According to Patterson, the price of a one-kilogram rare earth magnet is currently less than \$30. As a result, rare earth motors have begun to find uses in consumer products. Inmotion Technologies is using a rare earth motor patented by Patterson in a new type of bicycle. The bicycle uses a compact but powerful rare earth motor in the front hub, powered by a four-kilogram battery mounted to the frame. Riders use the motor to supplement their pedaling and when going downhill the riders can press a button and use the motor like a generator to recharge the battery. The system is light, efficient and can be added to a regular bicycle simply by replacing the front wheel and strapping the battery to the frame.

Small companies such as Inmotion are leading the way in the application of rare earth motors. Large manufacturers are still reluctant to use rare earth motors in products such as air conditioners and refrigerators. Rare earth motors for these products – if mass produced – would cost no more than current motors, but manufacturers would have to retool their factories to produce them. Retooling factories can cost millions of dollars. Manufacturers need to be convinced their investments will pay off.

"We're battling the inertia of manufacturers," Patterson said. "Big companies are driven by fractions of a cent." He recommends that all consumers insist on efficient products. "It drives me crazy – people wasting energy. Even if all of the country used half the energy on refrigerators, it would make a difference – a real difference."

... continued from page 23

are seeking escape." Increased agricultural production in the developing world would create jobs, and encourage the creation of infrastructure such as roads and railroads. Local agriculture would give a foundation that could create stability and provide a base for further economic development.

Large crop subsidies also increase the risk of mass famine throughout the developing world. American grain is so cheap in Africa and South America that farmers are often unable to sell grain at prices that are competitive with American imports. This situation makes many areas dependent on foreign food, and therefore more susceptible to famine. If the supply of imported food in developing countries is suddenly reduced, perhaps because of a war, then many people may starve.

Subsidy Reform

Subsidies should be available to growers in times of crisis such as a severe drought, but the money paid in subsidies would be better spent elsewhere during the rest of the time. The money spent in subsidies could be used to fund education or to encourage the development of other industries in rural areas. This money could also be used to fund programs such as Conservation Reserve Program – a program that pays farmers for keeping their land idle. This program is cheaper than paying subsidies to farmers, and it creates important environmentally protected land.

If subsidies are not seriously reformed, large companies will continue to pad their profits with people in developing countries and American taxpayers paying the price.

“Habitat
destruction
is the
biggest threat
to the
beetle.”

Steve Spomer

A Humbler Habitat

Tiger beetle finds unsafe home in Nebraska’s marshes

by Hilary Swanson

As flashy car dealerships, fast food restaurants and convenience stores pop up along North 27th Street in Lincoln and vie for the attention of I-80 bound motorists, it is easy to forget that the continuously developed area is home to what remains of Nebraska’s most threatened natural environment – and one of the world’s rarest insects.

The significance of the Salt Creek tiger beetle may escape most people, but the slim numbers of this beetle have more importance than swarms of other insects. The beetle is considered by many to be one of the rarest insects in the world occupying one of the most restricted areas in the world. The recognition of such a status may be helping to save the insect – and its unique habitat.

“The beetle represents the health of its ecosystem,” said Bill Allgeier, a graduate student in the University of Nebraska Lincoln’s entomology department. “The beetle’s low numbers indicate changes in its habitat. From a conservation standpoint, that’s the focus.”

Changes in the beetle’s habitat have been enormous. The Salt Creek tiger beetle is a geographically-isolated subspecies of the tiger beetle species and has adapted specifically to

eastern Nebraska’s saline wetlands, most of which are in Lancaster County. Urban and agricultural developments during this century have reduced these saline wetlands to just 10% of their original area in Nebraska. Rare plant and insect species –such as the saltwort plant and the Salt Creek tiger beetle – depend on these dwindling salt marshes for survival, and both species are currently listed as state endangered species.

The beetle was first named in 1916 and originally found near the Capitol Beach area west of Lincoln. The large number of specimens in the UNL State Museum from the Capitol Beach area indicates the beetle may once have been quite plentiful in that area, though today that is not the case. “The last time the beetle was found near Capitol Beach was 1996,” said Steve Spomer, a research technologist in the entomology department. “Habitat destruction is the biggest threat to the beetle.”

Spomer has conducted annual surveys of Salt Creek tiger beetle populations and distribution sites since the early 1990s. Currently, the largest population of beetles is near Arbor Lake, northwest of Lincoln. Smaller populations are found along the banks of Little Salt Creek and near Ceresco. For the past few years, the beetle’s numbers have hovered



The Salt Creek tiger beetle was first found near the Capitol Beach area west of Lincoln, Neb. Today, the largest population of beetles are near Arbor Lake, which is northwest of Lincoln. Due to growing commercial development in these areas, the beetle's habitat is in danger.

around 600, according to Spomer – this year's count was 558. "It's common for insect populations to fluctuate quite a bit," Spomer said, noting that recent drought conditions may actually be helping the beetle.

The beetle's habitat, however, is dangerously close to ongoing housing and commercial developments on and around North 27th Street, near the I-80 interchange. Freshwater runoff from streets and parking lots in the area could have a killing effect on the beetle – female beetles will only lay eggs on soil within a specific range of salinity. Pesticide runoffs from homes could also have an adverse effect on the remaining wetlands and their endemic creatures.

Developments are being made, however, in the protection of the saline wetlands. In early October, the city of Lincoln and the Saline Wetlands Conservation Partnership bought around 70 acres of land adjacent to Arbor Lake through funding from the Nebraska Environmental Trust, vastly increasing the amount of protected saline wetlands in the area.

The beetle is also awaiting designation as a federally endangered species. If listed, the Endangered Species Act (ESA) will authorize the U.S. Fish & Wildlife Service to prevent the further loss of the species and take recovery actions so it may be delisted – the ultimate goal of the listing. Such

recovery actions include seeking land purchases for critical habitat and restricting take of the species, as well as working with private landowners to develop Habitat Conservation Plans. The ESA also requires federal agencies to get approval from the USFWS to ensure that any projects they pursue will not adversely affect the listed species.



"A lot of the cost and burden now is put on the city and state," Allgeier said. "A federal listing would definitely help the beetles." Allgeier is also doing research to minimize the impact of existing and future urban development near the beetle's habitat. Since the beetle is attracted to light, illumination from urban developments near the saline wetlands can draw the beetle away from its habitat.

"The beetle lays its eggs in darkness," Allgeier said, "Light sources near the beetle's habitat may disrupt this critical behavior." Allgeier has conducted experiments to determine what intensities of light the beetle is most attracted to, finding that sodium vapor lights—commonly used outdoors—are least attractive to the beetle.

As for the long-awaited federal ESA listing, it could come through any day. The beetle was initially proposed for listing in 1992, but has not yet been granted federal protection. "We're just holding our breath," Spomer said.

Keeping Nebraska's 'Pheasants Forever'

by Cecelia Ozwig



Many families bond during cool afternoons and walk through cornfields in mid-November. Often, the father is teaching his son or daughter the delicacy of firearm usage and the excitement of a hunt. Afterward, pheasants provide a tasty meal and occasionally, a colorful mantelpiece. However, this family experience is on the verge of becoming an experience of the past.

Due to a past of over-hunting and lack of viable wildlife refuge, these plant-eating game birds that flourish in the grasslands of the United States are losing their hold on the grasslands of Nebraska. Pheasant farms are common in the northeast section of the state, but these farms raise birds that are unsuitable for release into nature. Upon release, most pose a threat to vehicle windshields and front grills because the birds do not know to avoid them. This is not the only reason we should be concerned with the pheasant population.

According to Gary Howey, Habitat Coordinator for the Lewis and Clark chapter of Pheasants Forever, "each bird that survives the winter brings more money into the state. Each

bird taken by an out-of-state hunter brings in \$300." The hunters rarely come alone. They stay in Nebraska's hotels, eat at restaurants and buy gas. Including the cost of the hunting permit, these expenditures represent a noticeable portion of Nebraska's income.

There is an organization that has set its goal on saving these defenseless game birds. The Lewis and Clark chapter of Pheasants Forever held a fundraising banquet on Oct. 9 at a ballroom in Hartington, Neb. Attending this banquet were many devoted hunters who are also avid nature enthusiasts. Pheasants Forever is made up of local farmers and businessmen who wish to see wildlife, specifically game birds, in northeast Nebraska continue to flourish. Their main group of projects is called The Lewis and Clark Pheasants Forever Habitat Improvement Projects. These projects have one goal: to provide food and permanent cover to help game birds make it through severe weather and expand the pheasant's population.

To achieve this goal, Pheasants Forever offers four specific programs: 1) a Free Grain and/or Forage Sorghum

Program which makes these products available to landowners who wish to establish food plots or a combination of food and cover; 2) a Food Plot Program which allows landowners to leave some food plots un-harvested and undisturbed through winter months on both CRP (Conservation Reserve Program lands, which are voluntarily unused by agriculture and for which the government reimburses the landowner) and other acres; 3) a Nesting Cover Program, which prevents mowing, grazing, haying or burning of established stands of alfalfa or grassy areas until after July 15 so that nesting cover which is critical for successful pheasant reproduction is able to be left undisturbed; and 4) a Wildlife Windbreak Program in which Pheasants Forever, working with Lewis & Clark Natural Resources Department (NRD) and the local Farm Service Agency (FSA) office, will provide everything needed to create shelterbelts.

Shelterbelts provide areas where wildlife can find relief from extreme weather conditions such as strong wind and snow. Pheasants Forever also consider cost-sharing other projects that may enhance or protect existing habitat critical to pheasants.

“Habitat is the key to having any kind of wild life. Pheasants Forever and other organizations are the only things keeping wildlife in the (Northeast Nebraska) area,” Howey said. In the past six years, the Lewis and Clark chapter of Pheasants Forever was able to assist landowners in planting more than 650 acres of food plots, 65 acres of nesting cover and planting 32,000 trees. The money raised through banquets like the one on Oct. 9 will be spent locally on habitat improvement for upland game birds.



Pheasants are plant-eating game birds that live in the grasslands of the United States, but their population is in danger. Hunting and the lack of wildlife refuge are quickly bringing down the numbers of these defenseless game birds.





Photos provided by Sphinx Productions

“Go Further” Goes Organic

by Sheeri Weyers

Who would have guessed a former co-star of *Cheers* and famous actor would end up devoting his time to creating organic awareness? Yes, organic awareness. “*Go Further*” is a documentary of Woody Harrelson’s tour de organica along America’s western coastline. Riding his bike more than 1000 miles, Harrelson disseminated his message to towns and universities. The documentary does a great job of not focusing on Harrelson as the star of the film, but instead presenting the story of a concerned human amid a crumbling ecosystem.

“*Go Further*” gives its audience the inside track on current innovations in solar technology, farming and substitutions for fossil fuel utilization. The tour bus for the film is presented in a way any environmentalist would gladly cheer. It is comprised of a fully function diesel fuel engine but runs off of hemp seed oil. All the electricity for the bus is solar powered. Even the fabric and paint used to decorate the bus are made from none other than hemp. The bus itself goes further to create a model for an environmentally friendly example of future automobiles.

The movie doesn’t stop there. Steve, an acquaintance of Harrelson’s, is a representative for the rest of the world – those outside the eco-conscious mindset. Steve smokes cigarettes, eats Snickers and drinks milk – until Harrelson gets a hold of him. Harrelson enlightens Steve to the “blood and puss”

that is present in his milk, and any other byproducts that come from milk. The film concludes with an enlightened and more organic Steve who uses a megaphone to disseminate such messages as, "There is blood in your ice cream," and "Corn dogs are bad for you."

Harrelson also makes introspective comments in his speeches to college students, one of which uses a quote from Margaret Mead: "Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it's the only thing that has."

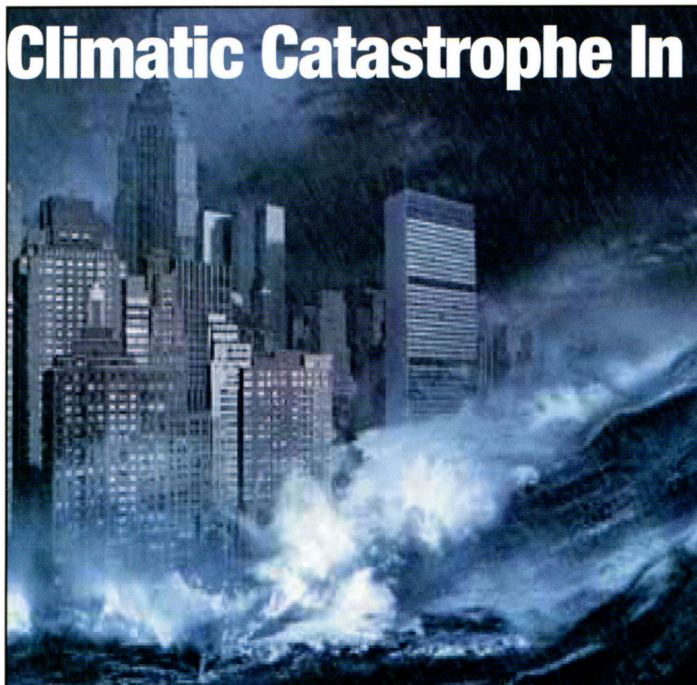
The film itself is an effective and important portrayal of what living organically means. It depicts how hard it is to give up everything you know and are comfortable with. It is not an easy task to take on this organic challenge, but the movie posits a great question and challenge. We need to think about the future and how our actions today will affect tomorrow. This is not a new revelation, but one that seems to be emerging from the themes of an apocalyptic crazed film industry.

Finally, the movie continues to portray the organic lifestyle as one that is inevitably coupled with being a hippie or living a similar lifestyle. It would have been effective for the documentary to step outside of this stereotype and show people who are vegan and still dress like Joe Public or even Joe Punk-Rock.

The organic lifestyle is not one that will be quickly accepted and integrated into most people's lives. The question we need to consider is when organic practices will become a necessity.



Climatic Catastrophe In Film and the Environment



by Sheeri Weyers

“The Day After Tomorrow” fits the typical apocalyptic movie mold – a lot of CGI and not a lot of substance. A poor script and overly dramatic sequences downplay what could have been a more politically and socially sound presentation of the effects of human consumption of natural resources. Director Roland Emmerich, (*“Independence Day”* and *“Godzilla”*) has diverged little from his former creations.

Jack Hall (Dennis Quaid) is a climatologist who studies the polar ice caps. He is very concerned with global warming and the melting of the ice caps. He presents his concern in front of many government officials from around the world, one of which is the Vice President of the United States (Ken Welsh), who also “happens” to look like the real vice president, Dick Cheney. Jack’s presentation proceeds with little respect from the vice president, who is more concerned with the economic strife America would face by cutting down on consumption of fossil fuels.

Reality smacks both Jack and the vice president in the face when in a matter of days, the North Atlantic currents change, causing polar ice caps to melt. California experiences gigantic tornadoes; New York is drowned in huge tidal waves of ice-cold water and arctic hurricanes engulf every continent above the equator. Eventually, all northern portions of every country in the world are overtaken by the next ice age. This ice age puts American citizens in an ironic position – they must flee to Mexico or face freezing to death.

All the while, Jack is trying to get to his son, who is in New York and is in a perilous situation. This father and son relationship is filled with the sappy lines and imagery in almost any apocalyptic movie. The movie has a typical lesson-to-be-learned ending and shows a new half-snow covered Earth.

The strength of *“The Day After Tomorrow”* is that it raises valid concerns about the danger our environment is in. The abruptness, however, of the polar melt down has created a lot of controversy for the film. Scientists debate the time scale the movie presents. Furthermore, the film has raised awareness of the ongoing global warming debate. What will be the result of humanity’s incessant use of fossil fuels? Is there anything we can do to prevent a catastrophe like the one presented in the film, or is there simply no return?

Peter Schwartz and Doug Randall address the possibilities of abrupt climate change in their report, *“An Abrupt Climate Change Scenario and Its Implications for United States National Security.”* Schwartz and Randall prepared this document for government officials who were questioning the effects of abrupt climate changes. Approaching this climatic problem with a focus on national security, the report shows little interest in trying to correct or slow the problem.

The Schwartz and Randall document illustrates that the main source of concern for such drastic climate shifts will deal mainly with food resources. Thus, here lies the national security issue of other people wanting the United States to share their wealth of abundant resources.

The neglect in addressing the social and political issues surrounding such climatic change raises many concerns. Schwartz and Randall address the burning of fossil fuels with a mere dismissal. *“(Changes in climate) may lead to finger pointing and blame, as the wealthier nations tend to use more energy and emit more greenhouse gases such as CO₂ into the atmosphere.*

The Schwartz and Randall document and *“The Day After Tomorrow”* serve as evidence that there is a rising concern for the environment and the climatic changes that are taking place due to consumption. What lessons we learn and the actions we take from encountering both are the doors to humanity’s demise or future.



Virtual Classroom Earns Students Master's Degrees

by Sheeri Weyers

Trying to get all the classes you want in a semester is hard enough, let alone trying to get them to all work with your schedule. That's the idea behind the use of the Internet and the UNL College of Engineering's Master Degree program. The program is designed with the ability for students to have a virtual classroom experience at a time when it is most convenient for them.

The program facilitates students' learning through Blackboard, multimedia lectures and interactive self-check tests. This program is a step forward from the distance education courses dating back to 1984, when the Engineering College began using such methods to educate students.

A closer look at what this multimedia program has to offer gives the students a chance to see interactive simulations in the areas of logistics and ergonomics. Students also gain the access to the most up to date software applications. The most interesting item on the list of benefits this program has to offer is video study sessions.

The College of Engineering is utilizing 21st century technology to make 21st century engineers. It will be interesting to see what the future holds, maybe no classrooms at all with virtual professors.



With the use of the Internet and Web cameras, students don't have to sit in class.

Nebraska Blueprint

<http://www.nuengr.unl.edu/cet/blueprint>
University of Nebraska-Lincoln
114 Othmer Hall
Lincoln, NE 68588-0642