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# Water Current, Volume 23, January 1991

# Water Current

**Water Center** ***University of Nebraska*** **January 1991**

## Twentieth Annual Water Conference to be Held Out-State March 12-13

"The Rivers of Nebraska: Character, Conflicts and Cooperation," the 20th annual Nebraska Water Conference, will be March 12 and 13 in Kearney at the Holiday Inn Convention Center and Kearney State College.

According to Les Sheffield, secretary of the Nebraska Water Conference Council, this is the first time since the 1972 annual conference founding by then University of Nebraska President D.B. "Woody" Varner, that the conference has been held outside of Lincoln.

Keynote speaker will be Bert Lamb, Colorado State University, who will discuss the policy aspects of rivers and their use and the resulting conflicts.

Jack Kennedy, director of the Iowa Institute of Hydraulic Research, Iowa City, Iowa, will be the major speaker of the first morning. Kennedy is

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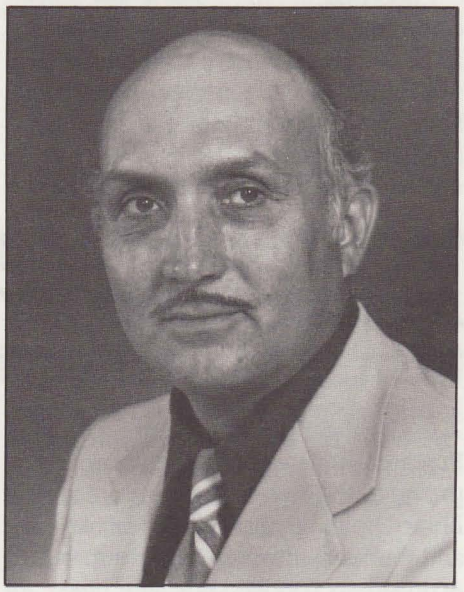
## Dual Challenge to Irrigators—Achieving Efficiency in Water and Energy Use

*This presentation was at the Joint Annual Meeting of the Nebraska State Irrigation Association and the Nebraska Water Resources Association at North Platte, Dec. 7, 1990 by Leslie F. Sheffield, Ph.D., Extension Farm Management Specialist, University of Nebraska-Lincoln.*



**Leslie F. Sheffield**

While I certainly do not want to be a "prophet of doom and gloom," I am seriously concerned about the current status of agriculture, especially as it relates to irrigated agriculture in the Great Plains states, such as Nebraska. One does not have to be a prophet or a fortune-teller to notice that some of the principal economic indicators relating to agriculture have been deteriorating instead of improving as we enter the decade of the 1990's.

This is especially true for petroleum-based fuels, the prices farmers receive for the crops they produce, as well as the reduction in federal farm program supports for agriculture.

The near collapse of the General Agreement on Tariffs and Trade (GATT) negotiations relating to the reduction in agricultural subsidies on a world-wide basis is also a cause for concern. The so-called Uruguay Round of GATT negotiations, which began in 1986, for the first time focused on agricultural trade barriers and subsidies. These negotiations are scheduled for completion this month (December). It now appears that no real progress will be made as a result of all the meetings and efforts by

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Conservation Notebook

## Best Management Practices Spelled Out in 1990 Conservation Notebook

Back in 1982 the Omaha World-Herald first published a weekly series during the growing season, called the "Conservation Notebook." It was written by University of Nebraska-Lincoln specialists and emphasized water and soil conservation. And in 1982 it was bound in booklet form for distribution.

Although the series has continued each year and has provided a showcase for water and soil conservation specialists' expertise to thousands of Nebraskans, it has not been bound for distribution until now.

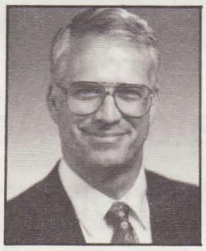
The 1990 21-week series has been assembled and is available for 75 cents for 30 or less copies, or 50 cents for 31 or more copies.

Just write or call the Water Center for your copies.☐

## *From the Director*

### Water Center Moves Ahead in 1991

I have had an exceedingly busy fall especially in traveling around the state talking with many agencies or groups about the Water Center and water-related problems in Nebraska. There are many places yet to go, and I look forward to more travel this spring including our Research and Education Centers.



**Bob G. Volk**

I find that communications are still a weak link in our system. We have to continue to work hard on that and find more and better ways to communicate all of the exciting and innovative research underway on campus and at our centers. To assist in that effort a number of new publications are available including. The Water Center Report, Occurrences of Pesticides and Nitrate in Nebraska's Ground Water, Burlington Northern Foundation Water Quality Project Final Report, and the bound Conservation Notebook. If you are interested in obtaininig copies, please let me know. We have also been working with Environmental Programs to fund additional NebGuides in the water sciences. These should be useful to many of you.

Again this year the Cooperative State Research Service (CSRS)/United States Department of Agriculture has a water quality program in Special Research Grants. The program is a reflection of cooperative planning at state, regional, and national levels. The request for research proposals was distributed to

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# Water Topics Included in New Acquisitions at C. Y. Thompson Library from Initiative Funding

Under the Nebraska Water Sciences Research Initiative, funding was provided the Water Center to enhance library holdings that include books and journals on water-related topics. Acquisitions received between July 1 and December 12, 1990 include:

Acidic Precipitation.
Adriano, D. C.

Biological Wastes.

Climate and Development:
Proceedings of the World Congress on Climate and Development.

Cost-Benefit Analysis of Irrigation and Drought Proofing. Puttaswamaiah, K. E.

Diatom Research: The Journal of the International Society for Diatom Research. International Society for Diatom Research.

Environmental Consequences of Nuclear War. Pittock, A. Barrie; Harwell, Mark A. and Hutchinson, T. C.

Environmental Models: Emissions and Consequences. Edited by Fenhann, J. et. al.

Estuarine Water Quality Management: Monitoring, Modelling, and Research. Michaelis, W.

Irrigation Theory and Practice: Proceedings of the International Conference held at the University of Southampton 12-15 September, 1989. Rydzewski, J. R. and Ward, C F.

Legal, Institutional, Financial, and Environmental Aspects of Water Issues: Proceedings of the

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# July Dates Set for 1991 Annual Irrigation Tour

West along the Platte River system through western Nebraska, eastern Wyoming and eastern Colorado, will be a part of the route for the 1991 Nebraska Irrigation tour.

Les Sheffield, tour wagonmaster, said "At the present time, we're looking at the week of July 22 through 26 as the dates of this annual tour."

He said, "We plan to travel along the North Platte River to Scottsbluff and on to Wyoming to visit the various dams and reservoirs on the North Platte River."

The route will continue into northern Colorado along the South Platte River system and back into Nebraska.

A few of the stops include: Lake McConaughy near Ogallala, an irrigated farm in the North Platte River Valley, UNL Panhandle Research & Extension Center at Scottsbluff, an overnight stay in Scottsbluff;

And in Wyoming: the Guernsey Reservoir, near Guernsey, the Glendo Reservoir, near Glendo, the Alcova Reservoir, near Alcova, an overnight stay in Casper, Pathfinder Dam and

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**Water Center**

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internationally recognized as a leading author on the problem of river behavior. The Iowa Institute is one of the premiere laboratories of the world that analyzes river problems.

Kennedy will analyze alluvial river systems: how they form and how they work.

Other highlights of the conference, announced by Bob Kuzelka, assistant director of the Water Center, include:

—A 30-page handout of maps and charts of Nebraska rivers, by Ray Bentall, Conservation and Survey Division.

—Speakers on river uses will include:

- Municipal
- Agriculture
- Industry and Power
- Recreation
- Aquatic life
- Riparian habitat
- Navigation
- Aesthetics

—Characterization of Nebraska Rivers fed by runoff, groundwater, the Platte River, Missouri River and the legal and administrative base for uses of Nebraska rivers.

—Viewpoints on Platte River conflicts and cooperation will be exchanged by Bob Crosby, attorney, and former Nebraska governor, and Christopher Meyer, attorney, for the National Wildlife Federation.

Kuzelka said a new feature of the conference will be two optional last day crane-watching tours. "One will be at 5:30 a.m., by chartered bus on the Platte River; the other at 5:30 p.m., at the Lillian Rowe Bird Sanctuary at Gibbon by individual car."

Another option for conference participants will be a tour of the Management Systems Evaluation Area (MSEA) at Shelton.

This conference is sponsored by the Nebraska Water Conference Council, the Institute of Agriculture and Natural Resources/ University of Nebraska-Lincoln, the University of Nebraska Water Center, and Kearney State College.

A registration form is on page 11.

# Nebraska Supreme Court Approves First Instream Appropriation

**by J. David Aiken**
**UNL Water and Agricultural Law Specialist**

On November 30, 1990 the Nebraska Supreme Court affirmed the grant of an instream appropriation on Long Pine Creek by the Nebraska Department of Water Resources (DWR) to the Nebraska Game & Parks Commission (GPC). The court affirmed the constitutionality of Nebraska's instream appropriation statutes. The Long Pine instream appropriation was the first granted by the DWR under Nebraska water law, and the *Long Pine* court decision is a strong legal affirmation of both the instream appropriation statutes and DWR administrative procedures in granting instream appropriations.

Long Pine Creek is a 33-mile tributary of the Niobrara River in Brown County near Ainsworth. Long Pine Creek is the state's highest rated cold water fishery, supporting rainbow and brown trout. The Long Pine instream appropriation application was originally filed January 8, 1987 and was initially dismissed by the DWR. After the application was resubmitted by the GPC, the DWR granted the Long Pine application of 50 and 60 cubic feet per second for two of the three stream segments requested on December 14, 1989. The Long Pine appropriation was the first granted under Nebraska's 1984 instream appropriation statute, and was vigorously contested by local irrigation interests.

On appeal to the Nebraska Supreme Court, many issues were raised, including whether the Nebraska Constitution prohibited instream appropriations. Article XV @ 5 of the Nebraska Constitution states that "the right to divert unappropriated waters of every natural stream for beneficial use shall never be denied except when such denial is demanded by the public interest." Irrigation interests argued that this "right to divert" language showed that the framers of the Nebraska Constitution intended only to authorize appropriations that involved a physical diversion of water from the stream, and that uses not involving a physical diversion of water were therefore not legal. The Nebraska Supreme Court rejected this argument, reasoning that the "right to divert" language was included in the Constitution to clearly adopt the appropriation doctrine and reject the riparian rights doctrine. The Court noted that regardless of what the original intentions of the framers of the Nebraska Constitution, that the terms and provisions of the Constitution "are constantly expanded and enlarged by [judicial] construction [i.e. interpretation] to meet the advancing affairs of men." The Court further noted that in the only other two western states with diversion language in their constitution, Idaho and Colorado, the Supreme Courts of both states had approved instream appropriation statutes as not violating a constitutional water diversion requirement.

The Court also ruled that the DWR had properly determined that unappropriated water was available for appropriation, that instream uses were not required to be "threatened" by new diversions before instream appropriations could be acquired, that the quantity appropriated did not need to be the absolute minimum required, and that the instream appropriations were in the public interest.

**Commentary**. The ratification of the Long Pine instream appropriation by the Nebraska Supreme Court is a major Nebraska water policy milestone. Unfortunately instream appropriation statutes will not play a major role in the current Platte River water disputes, because instream flows can be protected only where sufficient unappropriated water is available to completely satisfy the instream use. This approach cannot protect endangered species habitat in e.g. the central Platte River region because (according to state and federal wildlife officials) pending irrigation projects would leave insufficient unappropriated water for a new instream appropriation.

Additional legislation is needed to allow instream appropriations to be used conjunctively with water supply augmentation (including water right purchases) to protect instream values on the Platte and other Nebraska

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Secretary of Agriculture Clayton Yeutter to try to achieve a more nearly level field of competition for agricultural exports because of intransigence by the European Economic Community (EEC) and Japan. If these talks collapse without any real progress, it could signal the start of an international trade war on agricultural commodities.

How many of you saw on the TV news the report of the riot by Belgian farmers at Brussels, Belgium, protesting reductions in the subsidies that are paid to farmers for the commodities they are producing? The current GATT meetings are being held in Brussels. It must be nice for those farmers in the EEC who are receiving in the neighborhood of $5/bushel for corn, $8/bushel for wheat, and $15/bushel for soybeans. We need to remember that there are a great many people in Europe who faced severe food shortages in World War II, and those who are old enough to remember don't object very strenuously to paying large subsidies to agricultural producers.

In my opinion, those who irrigate in Nebraska are facing what I firmly believe will be among the greatest challenges they have ever faced, and that includes the period from 1981-1986 when many farmers encountered very severe financial difficulties. While those were indeed difficult times for many farmers and ranchers, I'm concerned that the decade of the 1990's may be equally difficult, if not more so.

Let us examine the prices farmers pay for petroleum-based fuels and the prices quoted for wheat, corn, and soybeans, three of the principal crops grown in Nebraska. While grain sorghum is also an important crop in Nebraska, the price paid to farmers for grain sorghum generally follows the prices paid for corn.

**Energy Prices:**

One would have to have been a Rip Van Winkle, never listen to the radio or television, or read a newspaper during the last few months, to not be aware of Saddam Hussein's invasion of Kuwait by his Iraqi military forces and the resulting tensions and threats of war which have arisen in the Middle East. Certainly, no one who drives a car, a pick-up, a tractor, or a combine can be unaware of what has happened to the prices of gasoline, diesel fuel, and propane from mid-July to the present time.

In mid-October, I conducted a telephone survey of five farm suppliers of diesel fuel and propane at five different geographic locations in the state, to determine what their mid-October prices were for these two products as compared to mid-July prices for the same products. Table 1 shows results of my survey and what the effects would be on the cost to produce an acre or a bushel of corn for grain with center-pivot irrigation in central Nebraska, provided the prices which existed in mid-October were to apply for the 1991 crop year.

## TABLE 1

**EFFECTS OF INCREASES IN PETROLEUM FUELS PRICES ON AGRICULTURE**

**Telephone Survey of Petroleum Fuel Suppliers in Nebraska, October 15-16, 1990**

| | Diesel Fuel | | Propane | |
|---|---|---|---|---|
| | Current | Mid-July | Current | Mid-July |
| Hi-Line Cooperative, Elsie, NE Farm-Delivered Prices | $1.20 | $.65 | $.79 | $.43 |
| Holdrege Cooperative Association Farm-Delivered Prices | $1.169 | $.669 | $.799 | $.449 |
| Aurora Cooperative Association Farm-Delivered Prices | $1.21 | $.67 | $.78 | $.44 |
| Knievel's, Inc., Ewing, NE Farm-Delivered Prices | $1.10 | $.66 | (Don't Sell) | |
| Battle Creek Farmers Cooperative Farm-Delivered Prices | $1.166 | $.65 | $.774 | $.44 |
| Totals | $5.845 | $3.299 | $3.143 | $1.759 |
| Average Prices | $1.169 | $.6598 | $.786 | $.44 |
| % Increase from Mid-July | 77.2 | | 78.6 | |

Obviously, making the assumption that mid-October diesel fuel and propane prices will prevail during the 1991 crop year is something that only an economist would do. Some articles I've read and some comments by "oil experts" I've seen on CNN and other television programs, have indicated that if war breaks out in the Middle East, and if much of the oil production and refining capacity in those oil-rich countries should be destroyed or threatened, then the price for a 42-gallon barrel of crude oil could jump to as much as $70-100 per barrel. This compares to the current level which has fluctuated between $27 to as much as $43 per barrel during the past three months.

Keep in mind that the increases in the current prices of crude oil occurred despite the fact there was no real shortage either in the U.S. or on the world markets of either crude oil or any of the petroleum-based products such as gasoline or diesel fuel or propane. Recent and current prices rose because of price speculation in the futures market based on the fear that war might occur, and if that happens, there could be resulting shortages of these petroleum products. At what price levels would these same petroleum-based products be today if a war in the Mid-East had occurred and petroleum products were really in short supply?

I'm sure I don't need to explain to you what a drastic effect $70-100 per barrel prices of crude oil would have on irrigated agriculture, or agriculture in general, or the entire U.S. economy where transportation costs are reflected in the prices of every commodity or product traded in this country. Assuming the same proportionate level of increase in diesel fuel, which occurred from mid-July to mid-October of 77 percent,

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when crude oil rose from about $18 per barrel to $35 per barrel, if crude oil rose to $70 per barrel, the corresponding price for diesel fuel would be $2.07 per gallon. With $100 per barrel for crude oil, we would be looking at $2.70 per gallon for diesel fuel, assuming the increases were proportional to those which occurred from mid-July to mid-October.

Even at mid-October prices of $1.17 per gallon for diesel fuel, or $.79 per gallon for propane, the costs of production for corn or any other crop produced in Nebraska have or will have increased. And the increased costs of production haven't been offset by corresponding increases in the prices farmers receive for any crops or livestock they produce.

For example, when I applied the 77.2 percent increase for diesel fuel prices and the 78.6 percent increase for propane from mid-July to mid-October to just the harvesting, drying, and hauling costs for corn produced under center-pivot irrigation in central Nebraska, this would have increased the cost of production by $6.75 per acre, or $.05 per bushel, in 1990. Applying these same percentage increases to all of the energy needed to produce an acre or bushel of irrigated corn in 1990, assuming the mid-October prices held steady in 1991, the costs per acre in this same example would increase by $25.76 per acre, or $.19 per bushel, based on an average corn yield of 135 bushels per acre.

In fact, prices for most crops we grow in Nebraska actually have declined, especially for wheat, corn, and soybeans while these energy price increases occurred. Table 2 illustrates what has happened to the prices quoted for cash grains, wheat, and corn at Omaha, and soybeans at Chicago, on a weekly basis from July 6, 1990, (pre-Kuwait invasion) and November 23, 1990. Obviously, prices actually paid to farmers at their local country elevators for these same dates would be much lower, depending upon the "basis" differential between those markets and the location of the nearest elevator from a specific farm.

Note that in the case of No. 1 H.R.W. wheat at Omaha, the price quoted declined by $.44 during this time period, while the price for No. 2 yellow corn at Omaha declined by $.48; and the price of No. 1 yellow soybeans at Chicago declined by $.42. Were there any corresponding decreases in the cost of production to produce any of these three commodities on the farm? The answer, obviously, is "NO."

## TABLE 2

**COMPARISON OF CASH PRICES QUOTED AT OMAHA FOR WHEAT AND CORN AND SOYBEANS AT CHICAGO, FOR THE PERIOD JULY 6 TO NOV. 23, 1990**

Source: CORNHUSKER ECONOMICS, published by the Department of Agricultural Economics, University of Nebraska-Lincoln
Prices quoted on a weekly basis as of each Friday

| Date | Wheat* | Change | Corn** | Change | Soybeans *** | Change |
|---|---|---|---|---|---|---|
| 7-6-90 | $3.09 | -0- | $2.62 | -0- | $6.17 | -0- |
| 7-13-90 | 3.02 | $-.07 | 2.62 | $0.00 | 6.09 | $-.08 |
| 7-20-90 | 2.95 | -.07 | 2.54 | -.08 | 5.90 | -.19 |
| 7-27-90 | 2.94 | -.01 | 2.59 | +.05 | 5.84 | -.06 |
| 8-3-90 | 2.75 | -.19 | 2.46 | -.15 | 5.86 | +.02 |
| 8-10-90 | 2.83 | +.08 | 2.45 | -.01 | 6.09 | +.23 |
| 8-17-90 | 2.81 | -.02 | 2.46 | +.01 | 6.16 | +.07 |
| 8-24-90 | 2.83 | +.02 | 2.53 | +.07 | 6.31 | +.15 |
| 8-31-90 | 2.65 | -.18 | 2.37 | -.16 | 6.01 | -.30 |
| 9-7-90 | 2.68 | +.03 | 2.28 | -.09 | 6.12 | +.11 |
| 9-14-90 | 2.68 | 0.00 | 2.15 | -.13 | 6.24 | +.12 |
| 9-21-90 | 2.68 | 0.00 | 2.15 | 0.00 | 6.08 | -.16 |
| 9-28-90 | 2.73 | +.05 | 2.11 | -.04 | 6.14 | +.06 |
| 10-5-90 | 2.71 | -.02 | 2.12 | +.01 | 6.13 | -.01 |
| 10-12-90 | 2.64 | -.07 | 2.13 | +.01 | 6.17 | +.04 |
| 10-19-90 | 2.64 | 0.00 | 2.11 | -.02 | 6.08 | -.09 |
| 10-26-90 | 2.61 | -.03 | 2.11 | 0.00 | 5.93 | -.15 |
| 11-2-90 | 2.69 | +.08 | 2.13 | +.02 | 5.90 | -.02 |
| 11-9-90 | 2.71 | +.02 | 2.17 | +.04 | 5.64 | -.26 |
| 11-21-90 | 2.65 | -.06 | 2.15 | -.02 | 5.68 | +.04 |
| 11-23-90 | 2.65 | -.03 | 2.14 | -.01 | 5.75 | +.07 |
| Change 7-6-90 To 11-23-90 | | $-.44 | | $-.48 | | $-.42 |

* No. 1 H.R.W. Wheat at Omaha
** No. 2 Yellow Corn at Omaha
*** No. 1 Yellow Soybeans at Chicago

**Efficiency of Water Application**

Now, let us turn our attention to the need for irrigators to achieve greater efficiencies in the water applied through irrigation to their crops. For those irrigators dependent upon surface water sources, there is justifiable concern about the future availability of adequate supplies of irrigation water—especially if there should be a severe drought like we had in the 1930's.

The amount of snowpack in the Rocky Mountains during the past few years has been below average, and therefore, the amount of run-off in the North Platte River system has been considerably below average. This reduced run-off in the North Platte River system has caused reservoirs in Wyoming and Nebraska to fall below normal, and this certainly applies to Lake McConaughy. The same concerns

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# 1991 Water Legislation: Pesticide Regulations

**by J. David Aiken**
**UNL Water and Agricultural Law Specialist**

No significant water legislation was enacted in 1990. A study of water exports by the UNL College of Law is expected early in the 1991 legislative session, which could lead to legislative consideration of the water exports issue.

The major water quality bill in 1991 will be once again the state assumption of the federal pesticide program, a prerequisite to the state's administering the EPA pesticide strategy (due for spring 1991 release). Funding state and local ground water protection programs may also be an issue, with agchemical user fees a possibility. Modification of instream appropriation statutes may be requested by environmental interests.

**State Pesticide Regulations.** Under federal pesticide statutes, states may assume administration of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), which primarily would include administering certification of pesticide applicators and establishing any state restrictions on pesticide use. LB161 from the 1989-90 legislative session would have authorized the Nebraska Department of Agriculture (or other agency desginated by the Governor) to assume state FIFRA administration.

The Agriculture Department would ahve the option of cooperating with the Department of Health, the Department of Water Resources, or the Department of Environmental Control regarding enforcement of ground water quality regulations. Pesticide regulations would not change dramatically, they would simply be enforced by the Nebraska Department of Agriculture rather than by the U.S. Environmental Protection Agency.

Under the proposed EPA pesticide strategy, EPA will prohibit, or severely restrict, the use of particular pesticides that could contaminate drinking water quality in that state. Now that Colorado has adopted legislation taking over the federal pesticide program, Nebraska would be the only state in the U.S. that could not qualify for state administration of EPA pesticide regulations because Nebraska is the only state not administering FIFRA. LB161 would have remedied this, but was not acted upon in the 1990 at the request of agricultural chemical dealers and distributors.□

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Symposium Sponsored by the Irrigation and Drainage Division and the Water Resources Planning and Management Division of the American Society of Civil Engineers and the Delaware Section ASCE: University of Delaware. Baumli, George I.

Milestones in Environmental Physiology. Yousef, Mohamed K.

Nitrates: the Threat to Food and Water. Dudley, Nigel.

Proceedings of the Symposium on Climate Change in the Southern United States: Future Impacts and Present Policy Issues. Edited by Meo, Mark.

Proceedings of the XI Congress of the International Society of Biometeorology. Driscoll, D.; Box Elgene Owen and Lieth, Helmut.

Regional Acidification Models: Geographic Extent and Time Development. Kamari, J.

The Water Encyclopedia. Van der Leeden, Frits; Troise, Fred L. and Todd, David Keith.

Watershed Management in the Eighties: Proceedings of the Symposium Sponsored by the Committee on Watershed Management of the Irrigation and Drainage Division of the American

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Reservoir, the Kortes Dam and Reservoir, and the Seminoe Dam and Reservoir with an overnight stay in Rawlins;

In Colorado: the headwaters of the North Platte River will be visited and overnight will be spent at Grand Lake. From Grand Lake the buses will travel over Trail Ridge Drive to Estes Park, with a bus-briefing by U.S. Bureau of Reclamation and Northern Colorado Water Conservancy District officials.

From Estes Park to Loveland will be the last leg of the Colorado tour with a nonviewing trip straight through Nebraska back to Lincoln.

More information about the tour will be available at the 1991 Nebraska Water Conference in Kearney, or call Sheffield at (402) 472-1773.□

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faculty and approximately 10 Nebraska proposals were received by the Water Center and forwarded to CSRS. We have hopes that several of these will be approved and receive federal funds.

The United States Geological Survey also funds water-related research through its Section 104 and 105 program. Faculty have responded to this call for proposals by submitting over 15 requests. Again, the time faculty spend in grant writing should produce several winners.

I should re-emphasize the importance of the Nebraska Research Initiatives to you. These new funds are greatly enhancing our ability to respond to Nebraska's water research needs. This year we are placing new faculty positions in Biological Sciences, Agronomy, and in the Medical School. When these positions are filled, our research base will be strengthened and broadened in water-related programs.

We have also funded graduate assistantships, post-doctorates, scientific equipment and library books. Our Research Initiative program is multidisciplinary and will touch faculty in many departments including faculty at UNO, UNMC, and UN at Kearney. We have a strong start but must continue to expand the Research Initiative funding for the Water Center.

On a personal note, I thank the many of you who have helped me better understand Nebraska and its needs related to quality and quantity of water. Please continue this dialogue. The more information we have, the better our decisions will be, *Bob G. Volk.*□

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exist for reservoirs in the Republican River Basin and in the Box Butte River Basin, so reservoirs along those river systems are also below normal.

If irrigators who receive their water from one of the Irrigation Districts dependent upon the reservoirs in these three river systems, could increase the efficiency of their on-farm application of irrigation water by just 20 percent, this would mean the limited supplies of surface water would last that much longer in the event of a severe drought. To achieve 20 percent increase in on-farm efficiency, a farmer who normally applies 15 acre-inches of water would need to reduce his average application to 12 acre-inches of water. This might be achievable in years when the weather cooperates, but in hot, dry years like we've sometimes experienced, most irrigators don't want to take a chance on reducing their crop yields.

For those irrigators who depend on groundwater with irrigation wells to provide the water to supplement precipitation, there is a direct correlation between the amount of water pumped in a given year and the cost of energy used to operate their irrigation pumps. With sharply higher prices now for diesel fuel and propane, and if these higher prices remain in effect for the 1991 crop year, those who use either diesel or propane engines to power their irrigation pumps, it will be in their own self-interest to conserve both energy and water. This would require either using some type of soil moisture monitoring, such as gypsum soil-moisture blocks, tensiometers, or the use of an agricultural consulting firm which monitors soil moisture levels and makes recommendations on when to apply irrigation water and how much to apply with each application.

Another way irrigators using center-pivot or linear-move sprinkler systems might save both energy and water is to convert high-pressure sprinkler systems to low-pressure systems and reduce the gallonage put through their sprinkler systems. For an efficient pumping plant and sprinkler system with proper balance between the pump, engine, and sprinkler system, this may require considerable expense in changing the pump bowls, and perhaps the motor or gear head (for internal combustion engines), as well as to change from overhead rotating sprinklers to some type of spray or LEPA-type (Low Energy, Precise Application) system.

Dr. Bill Lyle, agricultural engineer with Texas A&M University, who is with the Lubbock Research & Extension Center and conducts research at a research station at Halfway, Texas, is the father of the LEPA concept. We visited his research facilities and different sprinkler systems on the 1990 Nebraska Irrigation Tour to western Kansas and the Oklahoma and Texas panhandles. Dr. Lyle has some very interesting research in progress, including what he calls a MIPS system (Multi-purpose Irrigation and Planting System) using a linear-move system on which he has added a planting system combined with a chemigation system.

However, you don't have to travel to Texas to observe what can be done to improve on both water application efficiency with center-pivot systems and increase crop yields at the same time. Ted Tietjen, president of Big Byron Agri-Services at Grant, Nebraska, has an experimental center-pivot system on his research farm located just east of Grant. When I visited with Ted last month, he gave me a copy of their LEPA Project tests for 1990 from the different types of sprinkler configurations on the same center-pivot system.

Of the nine different sprinkler configurations used in 1990, the best results with a yield of 214 bushels/acre obtained with Senninger LEPA Drop Nozzles (L.D.N.) which were set in the chemigation mode to spray upward from two feet above the ground surface. The corn was planted in circular rows, a practice that is quite common in Texas but seldom used in Nebraska. Ted Tietjen told me that he thinks part of the yield differences achieved in this test in 1990 was because there was a red spider mite infestation in August and, apparently, the upward spray toward the underside of the corn leaves created an environment which wasn't conducive to red spider mites. However, he said he is convinced that the higher-yielding plots also benefitted from more efficient use of the irrigation water that was applied.

Obviously, if it is possible by using LEPA-type systems to achieve average yields that are 20 or more bushels per acre over those with the overhead rotating impact-type sprinkler systems on a consistent basis, then this 20 bushel/acre increase at an average price of $2.25 per bushel would amount to $45 per acre.

(see page 8)

(Library p. 6)

Society of Civil Engineers in Conjunction with the ASCE Convention in Denver, Colorado, Cooperating Sponsors, Society for Range Management, American Society for [I.E. of] Agricultural Engineers [and] American Water Resources Association. Jones, E. Bruce and Ward, Timothy J.

Environmental Impact Assessment Review.

Environmental Management.

Environmental Toxicology and Chemistry. Setac Society.

Journal of Fish Diseases.

Aquaculture and Fisheries Management.

Gis World.

Journal of the World Aquaculture Society.

New Scientist.

Peptide Research

Practical Aquaculture & Lake Management. Aquaculture Advisory Service.

Regulated Rivers.

Rivers. Aiken, J. David.

Science Citation Index [Computer File]. Institute for Scientific Information.

In addition to the above books, proceedings and journals C. Y. Thompson Library now has **U. S. Water News,** a monthly tabloid newspaper.

Water-related faculty who have water-related book or journal titles they wish to have included in the acquisitions of C. Y. Thompson Library, call Pat Larsen at the Water Center (402) 472-3305.□

# Seminar on Farm Management Impacts on Water Begins

No state is completely immune to nitrate contamination due to the widespread nature of nitrogen sources, Roy Spalding, associate director of the University of Nebraska Water Center said. He spoke to the first session of a seminar series on "Nitrate and Atrazine in the Waters of the U.S.A."

"There is a skew distribution of nitrate contamination nationally in both ground and surface water," he said. The Eastern USA is relatively free of ground water nitrate contamination, but has increasing levels of surface water nitrate levels in many areas.

"The Midwestern corn belt, west of the Mississippi River has the majority of ground water nitrate problems. Problems are extensive in Iowa, Nebraska, Kansas, and California, he said.

"When we look at groundwater contamination, we sometimes ask 'why here and why not there'?" He cited several research examples of different states to explain the complex processes involved. Examples from New York, Pennsylvania, Delaware, North Carolina, Georgia, Florida, Ohio, Iowa, South Dakota, Nebraska, Kansas, Texas, Montana, California, and Washington illustrated the processes reponsible for the nonuniform distribution in ground and surface water contamination.

Nitrate sources contamination is usually man-induced and may come from many major sources. He said he sees a national trend that nitrate contamination may stabilize or decline in older farming or dryland areas as old wells that are of poor construction are replaced.

"In contrast, a continued increase in highly irrigated areas is predicted unless major farm management changes are instituted." This is evident in California where 4 percent of the municipal water wells have been closed due to nitrate contamination in a highly irrigated area, Spalding said.

He was the first speaker in the annual Water Resources Seminar Series Wednesday (Jan. 16). The 1991 series meets Wednesdays at 3:30 p.m., room 117, Bessey Hall, on the UNL City Campus, and attracts state and county personnel besides students who get an hour's academic credit.

Spalding said this year's seminars focus on the Management Systems Evaluation Area (MSEA) in Nebraska with speakers explaining other states' MSEA sites.

He said there are five MSEA sites in the U.S. as part of the Presidential Initiative on Water Quality. The Nebraska site is a cooperative project between the University of Nebraska, Institute of Agriculture and Natural Resources, the Water Center and the USDA-Agricultural Research Service with cooperation from the Central Platte Natural Resources District and other state and federal agencies.

**The schedule:**

Jan. 23—Overview of President Bush's Initiative on Water Quality with Emphasis on Mid-West Initiative: Bill Larson, University of Minnesota.

Jan. 30—Iowa MSEA Site Activities, Agrichemicals in Soils and an Introduction to the Ames, Tilth Laboratory: Jerry Hatfield, director of the Tilth Laboratory, Ames, Iowa.

Feb. 6—Overview of Projected Socio-Economic MSEA Research: Ray Supalla, professor of agricultural economics, UNL.

Feb. 13—An Overview of Ohio MSEA Activities: Terry Logan, professor of soil chemistry at Ohio State University. This will also be the 1991 Kremer Lecture.

Feb. 20—Site Activities, Perspective on Irrigation: Dean Eisenhauer, UNL Biological Systems Engineering, Nebraska MSEA investigator.

Feb. 27—Preliminary Hydrogeochemical Characterization of Groundwater at the Nebraska MSEA Site: Mary Exner Spalding, UNL Conservation & Survey Division; and Groundwater Modeling at the Nebraska MSEA Site: Vitaly Zlotnik, UNL Geology Department.

March 6—An Overview of Minnesota MSEA Activities: Bob Dowdy, soil scientist, USDA-ARS, Minnesota MSEA.

March 13—No seminar—Annual Water Conference in Kearney.

March 20—Overview of Fertility and Crop Production Activities: Jim Schepers, soil chemist, ARS, UNL agronomist;

March 27—No seminar-spring break.

April 3—USGS Activities at Nebraska MSEA Site: Doug Druliner, USGS hydologist, Lincoln.

April 10—Component Research at North Platte: Norm Klocke, extension water resources engineer at the UNL West Central Research and Extension Center, North Platte.

April 17—Geostatistical Research Potential at Nebraska MSEA Site: Istvan Bogardi, professor of UNL Civil Engineering.

April 24—Soil Physics Research: Bill Powers, professor of UNL Agronomy.

May 1—Future Federal Emphasis on Water Quality and Agriculture: Berlie Schmidt, soil scientist, CSRS-USDA, Washington, D.C.

For more information, call Spalding, seminar coordinator, at the Water Center, (402) 472-7558. The public is invited, he said.□

(Challenge p. 7)

On the basis of 130 acres for a standard center-pivot system, this would amount to $5,850 per circle, which would go a long way toward paying for the costs to convert a sprinkler system, pump, and motor to the LEPA system. Those irrigators who want to survive in the long run will need to keep up with the research being done to make irrigation more efficient on their farms, and utilize technology that will enable them to produce higher yields than are currently being achieved. If the LEPA study results from the 1990 test at Big Byron Agri-Services research farm can be achieved on a regular basis, then it would appear that farmers using this LEPA technology can conserve both energy and water while increasing their average yields.□

# EPA Announces Pesticide Survey Results

**by Larry D. Schulze**
**Extension Pesticide Coordinator**

EPA has released the results of the National Pesticide Survey. This survey was the first and perhaps the most extensive monitoring survey undertaken to evaluate the presence of pesticide, pesticide degradates, and nitrate in drinking water wells in the United States.

The Survey had two principal objectives: 1) to determine the frequency and concentration of the presence of pesticides and nitrate in drinking water on a national basis, and 2) to improve EPA's understanding of pesticides and nitrate in drinking water wells are associated with patterns of pesticide use and the vulnerability of ground water to contamination.

EPA's Phase I Report provides national estimates of the occurrence and frequency of detections of nitrate and pesticides in drinking water wells. About 750 rural domestic wells (representing 10.5 million rural domestic wells) and 540 community water systems (representing 94,600 community water system wells) were sampled in the survey between 1988 and 1990.

The wells selected across the country were not selected on the basis of any knowledge or suspicion of a problem with pesticide contamination. Rather, the wells were chosen as part of a nationwide random sample, from areas with varying pesticide use and groundwater vulnerability to pesticide contamination.

In Nebraska, 13 rural domestic wells were sampled in Burt County. Six towns or community water systems in Nebraska were also sampled.

All water samples were tested for the presence of 101 pesticides, 25 pesticide degradates or byproducts, and nitrates. Through the survey, 500,000 chemical analyses were conducted on 30,000 water samples. A referee laboratory analyzed 10 percent of samples to confirm accurate laboratory findings.

The EPA is quick to point out that individual well results do not provide an assessment of ground water quality or pesticide contamination of drinking water wells at the local, county or state levels because the wells selected from these areas were not chosen to represent the area.

According to a USDA communication, the EPA said the results revealed no current cause for alarm. However, EPA said there is cause for concern due to the level of nitrate detected. Atrazine and DPCA acid metabolites (dacthal) were commonly detected. Dacthal is a herbicide used primarily to control annual grasses in turf, ornamentals, strawberries, and seeded vegetables in Nebraska.

All of the detected pesticides and nitrates were compared to the Maximum Contaminant Level (MCL). A MCL is the maximum permissible level of a contaminant in water that is delivered to any user of a public water system. MCLs are enforceable standards. Although the MCL is not legally applicable to rural domestic wells, it was used as a standard of quality for drinking water.

The National Pesticide Survey found low levels of nitrate common, pesticides much less common. Only 2.4 percent of rural and 1.2 percent of community wells had nitrate-nitrogen above the MCL of 10 parts per million.

The proportion of wells nationwide found to contain any particular pesticide or pesticide degradate is low. Less than one percent of rural or community wells have a pesticide over the MCL. Survey results do not demonstrate any immediate widespread health problem according to EPA. (From: **The Label** Newsletter, Nov. 1990, Vol. 2, No. 10)□

# Farm Chemical Reduction Would 'Result in Higher Food Prices'

Farm prices would go up resulting in higher food prices and expenditures due to reduced yields and production, according to a report from Texas, if there were major reductions in farm chemicals use.

The report, "Economic Impacts of Reduced Chemical Use" outlines the economic impacts to the U.S. from farmers to the general economy and consumers. The 103-page study report analyzes the U.S. economic impacts of reducing chemical use and draws the following conclusions:

—Consumers would spend $228 more each year per household if pesticide use were eliminated (in terms of 1989 dollars).

—The annual rate of increase in food prices during 1995-98 would reach double digit levels compared with the world food crisis of the early 1970s.

—Exported grain and cotton would decrease by 50 percent.

—Cultivated acreage would increase 10 percent and permit an associated erosion loss.

—Increased income for crop producers would be offset by a decrease in livestock producers income.

—Crop production in Southern states would decrease more prominently than in Northern states due to larger reductions in yields where climates are favorable to pests and soils are deficient in nitrogen and other nutrients.

—Higher unit costs of production would result in lower crop yields.

More than 140 agricultural scientists analyzed corn, soybeans, wheat, barley, cotton, rice, peanuts and sorghum production. University of Nebraska corn and soybean research sources included: Ken Frank and Alex Martin, Agronomy Department; Z. B. Mayo, Entomology Department; and David Wysong, Plant Pathology.

Project director was Ronald D. Knutson, director of the Agricultural and Food Policy Center at Texas A&M University. The report was published by the Agricultural and Food Policy Center, Department of Agricultural Economics of the Texas A&M University System in cooperation with

☞ (see page 10)

# Special Announcements

## NATO Institute

"Risk and Reliability in Water Resources and Environmental Engineering" will be the topic of the North Atlantic Treaty Organization (NATO) Institute May 18-28, 1991 in Porto Carras, Greece. The announcement states, "Uncertainty analysis including stochastic and fuzzy approaches and the use of engineering risk and reliability aspects are suitable for studying quantitative aspects of water resources problems, such as floods, droughts, water supply and structural safety in hydraulic works. They are also useful for the description of water quality environmental problems, such as river and coastal pollution and the design of wastewater treatment plants.

Istvan Bogardi, UNL Civil Engineering, is included on the provisional list of lecturers.

Funds are available for subsidizing travel or lodging expenses of graduate students or other qualified participants. For further information contact Bogardi or: Prof. L. Duckstein, Systems & Ind. Engineering, University of Arizona, Tuscon, AZ 85721, or Prof. J. Ganoulis, Dept. of Civil Engineering, Aristotle University of Thessaloniki, 54006 Thessaloniki, Greece, Tel/Fax (+30) (31) 99.26.97 or (31) 213108 (home).

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## EPA Announcement Delayed

The Environmental Protection Agency's competition announcement in April for proposals to establish exploratory environmental research centers will be in August with funding to begin in October.

EPA said that although winners were to be announced in April, plans were revised because of budget and personnel constraints. Eighty-seven eligible proposals were received that will be reviewed by seven groups.

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## USDA Cautions Producers

The 1990 Farm Bill that was signed into law Nov. 28, 1990 has changed conditions under which producers could lose U.S. Department of Agriculture benefits because of "swampbuster" violations.

Alteration of a wetland, under the new law, may call for swampbuster penalties for current and following crop years. Under the old law planting the annual crop on a converted wetland was the only trigger for a penalty.

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## Data Bases Available

The National Ground Water Information Center operated by the National Water Well Association, maintains computerized, on-line data bases, accesses other important on-line data base systems, and retrieves documents from an international network and provides customized research on all groundwater-related topics.

The Center also has an audio tape loan and transcription service of more than 550 workshops and seminars on groundwater topics and offers inter-library loans from its 20,000-volume collection.

For more information, contact NGWIC, 6375 Riverside Drive, Dublin, OH 43017, or phone (614) 761-1711.

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## Publication Explains Clean Water Act

A Citizen's Guide to Clean Water that explains the history and provisions of the Clean Water Act and advocates citizens taking a positive role in water issues, is available.

The booklet discusses history, objectives and funding of the Clean Water Act and the regulatory structure and programs that operate under the act. An action checklist and hints for collecting information and promoting effective citizen participation is included.

Order this 50-page, soft-cover publication from the Izaak Walton League of America, 1401 Wilson Blvd., Level B, Arlington, VA 22209, or phone (703) 528-1818.

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## Pesticide Crop Use Study Released

"Pesticide Use on Crops in Nebraska-1987" Research Bulletin 311 by Maurice Baker, Nancy Pederson and Shripat T. Kamble has been published by the Agricultural Research Division of the Institute of Agriculture and Natural Resources, University of Nebraska-Lincoln.

According to the researchers, the survey determined the use of pesticides on crops, pasture and rangeland and identified pest management practices. It's the third and "most comprehensive study of pesticide use on crops in Nebraska."

The 34-page booklet is available from the Department of Ag Communications, 104 Agricultural Communications Building, University of Nebraska-Lincoln, Lincoln, NE 68583-0918.□

(Reduction p. 9)

the National Fertilizer and Environmental Research Center of the Tennessee Valley Authority.

Knutson concluded: "These data by no means represent the final answer on the issue. One major gap lies in the complete lack of information on fruits and vegetables.

"In addition," he said, "no attempt was made to collect data on the impacts of chemicals directly utilized in the production of livestock, dairy, and poultry. These gaps obviously need to be filled."

For more information about the study, write Knutson at 1011 Rose Circle, College Station, TX 77840.□

Clip and Mail

# ADVANCE REGISTRATION FORM
## 1991 Nebraska Water Conference
## Holiday Inn -- Kearney, Nebraska
## March 12-13, 1991

Mail to 304-B Filley Hall
University of Nebraska-Lincoln
Lincoln, NE 68583-0922
(Phone: 402-472-1773)

| Option Number | Includes | Price/ Person |
|---|---|---|
| 1 | Full Registration for both days with 4 meals and all coffee/juice breaks (DOES NOT INCLUDE OPTION 9) | $70.00 |
| 2. | 12th Registration with 1 Lunch, 1 Dinner & Breaks | $45.00 |
| 3. | 13th Registration with 1 Breakfast, 1 Lunch & Breaks | $30.00 |
| 4 | Registration -- No Meals, for Both March 12 and 13 | $35.00 |
| 5. | 12th Registration Only, No Meals, but Coffee Breaks | $25.00 |
| 6. | 13th Registration Only, No Meals, but Coffee Breaks | $20.00 |
| 7. | 12th Luncheon Ticket Only | $ 8.00 |
| 8. | 12th Banquet Ticket Only | $17.00 |
| 9. | Mar. 13th Crane Watch Tour, 5:30 a.m. Trip to Platte R. (Weather Permitting -- Not Included in Option 1,3,4 or 6) | $10.00 |
| 10. | 13th Breakfast Ticket Only | $ 7.50 |
| 11. | 13th Luncheon Ticket Only | $ 7.00 |
| 12. | LATE REGISTRATION FEE (After March 5, 1991) | ADD $15.00 |

PLEASE MAKE CHECKS PAYABLE TO THE "NEBRASKA WATER CONFERENCE COUNCIL"

List Option or Options:_____ Amount Enclosed: $_____

Name: _____ Position: _____

Organization: _____ Address: _____

Town: _____ State: _____ Zip: _____

Day Phone: (_____) _____ _____ Res. Phone: (____) _____ _____

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LODGING REQUEST FORM: KEARNEY HOLIDAY INN, P.O. Box 1118, Kearney 68848
Inbound WATS: (Reservations: 800-652-1909)
Regular Phone: 308-237-3141

Convention Rates for 1991 Nebraska Water Conference, March 11-12, 1991:

| | |
|---|---|
| Single Room, 1 Bed, 1 Person | $40.33 including 9% Tax |
| Double Room, 2 Beds, 2 Persons | $45.78 including 9% Tax |
| Room with King Bed for Couple | $45.78 including 9% Tax |

Name: _____ No. of Persons: _____
Address: _____, Town _____ State: _____
Zip: _____; Phone: (____) _____ - _____
Arrival Date: _____ Departure Date: _____
Arrival Time: Before 6:00 p.m. _____; Guaranteed arrival: _____
Credit Card Name: _____; Exp.: _____; Card # _____

# Children's Environmental Education Topic for Conference and Festival in Grand Island March 4 and 5

A back-to-back, day-long educational conference and festival are scheduled for March 4 and 5 in Grand Island. One is planned for teachers and natural resources professionals; the other for children with a special teachers' resources room available.

The March 4 Environmental Education for Nebraska Conference is designed to improve coordination and delivery of effective classroom and field programs on the environment.

Organizers of the conference said that some of Nebraska's most innovative educators will explain how to have effective classroom and field programs.

They hope to develop a statewide Environmental Education Resource Center to coordinate the delivery of environmental education programs, materials and information.

Registration deadline is Feb. 20 for the conference at the Interstate Holiday Inn, Grand Island. Write or phone the Lower Platte North NRD, P.O. Box 126, Wahoo, NE 68066.

The third annual Children's Groundwater Festival will be March 5 at the Grand Island Community College. Sponsored by the Nebraska Groundwater Foundation, and the Water Center, the festival is the prototype for other children's water festivals in the state.

According to Susan Seacrest, Groundwater Foundataion president and founder, "After two years of success, this year's festival promises to be even more exciting with new activities and displays."

New activities include: Paul Messner puppets, KOLN-KGIN TV live weathercast and meteorology/weather forecasting, Water Quiz Bowl, What a Bunch of Garbage! and Meet Wally & Wanda Water!

Seacrest added that back-by-popular demand activities include:

- ★ "Dripial Pursuit" and "Puddle Pictures" tournaments
- ★ Water Theatre
- ★ Computer games
- ★ Giant bubbles
- ★ Water Magic
- ★ Build your own acquifer
- ★ Papermaking

Last year about 2,500 children attended. This year, in fairness to all who registered by Jan. 14, schools will not be selected on a first-come, first-served basis. Instead, all schools registered before the deadline were entered into a random drawing. The first 3,000 students drawn will attend the festival. Schools that are turned away will receive first preference for next year's festival.

Call Amy Quandt at (402) 476-2729 for more information.

## Dates to Remember

**March 4**
Environmental Education for Nebraska Conference, Interstate Holiday Inn, Grand Island.

**March 5**
Children's Groundwater Festival, Grand Island Community College.

**March 12, 13**
20th Annual Nebraska Water Conference, Kearney Holiday Inn.

**July 22-26**
Nebraska Irrigation Tour to Western Nebraska, Wyoming, and Colorado.

(*Water Current* articles describe activity, itinerary, and contact.)

(Supreme Court p. 3)

streams where instream needs cannot be completely satisfied from unappropriated water. The continued absence of such legislation virtually guarantees continued environmental opposition to new water projects on streams with significant environmental values, such as the Platte.□

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**103 Natural Resources Hall**
**University of Nebraska**
**Lincoln, NE 68583-0844**

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