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Water Current

Water Center/Environmental Programs

University of Nebraska

December 1992

Seminar Series to Feature Global Perspective

A controversy between Czechoslovakia and Hungary over a massive hydroelectric dam and diversion on the Danube River will be one of the topics on the 1993 Water Resources Seminar Series.

This 17th annual semester-long seminar offered by the University of Nebraska Water Center/Environmental Programs will feature speakers on:

- Global Climate Change,
- International River Management, and
- Agriculture and the Environment.

Speakers for the seminar will come from several countries and different professional backgrounds. Five will be from Hungary through the U.S. Information Agency (U.S.I.A.)-funded program, "Environment and Politics."

Speakers from Hungary will include:

Judith Bartholy, who will speak on "Human Intervention and Climate Change in Agriculture and the Environment During the Last Years of Communism in Hungary,"




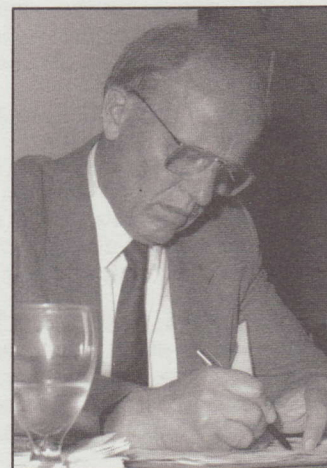
Bela Vajdovich, "Perspectives of Agriculture and Environmental Protection after the Collapse of Communism in Hungary, and

Gyorgy Samsondi Kiss, "International

Conflicts over Danube River Development: The History" and "International Conflicts over Danube River Development: A Possible Solution."

The U.S.I.A. program is a cooperative

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Who is This Researcher?
(See page 3.)



CUNOVO, Czechoslovakia, Oct. 24—A truck unloads a cargo of large rocks on the Danube river, as Czechoslovaks began dumping rocks and earth into the Danube Saturday to divert the river's course in a controversial dam project that has strained relations between Slovakia and neighboring Hungary. Hungary objects to the Danube diversion at the massive Gabčíkovo-Nagymaros hydroelectric dam project saying it will altar Hungary's frontier. (AP Photo).

Take a Look Inside.

Sheffield Leads Tour to South America

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Water Conference Celebrates Centennial of Irrigation Association

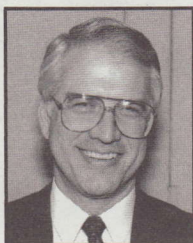
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Report from the Director

Welcome to an edition of our *Water Current* with an international perspective. The University and the Water Center/Environmental Programs routinely host visitors from a number of other countries. Additionally, members of the University staff visit and lecture around the globe. We believe it would be useful to provide you with several perspectives on these guests and visits as they relate to the quality and quantity of the water



Bob G. Volk

resource in selected countries. The range of included countries is from Brazil to Hungary and Czechoslovakia.

The 1993 Water Resources Seminar also will have an international perspective. This weekly series of lectures is presented annually each spring semester by the Water Center/Environmental Programs. Details on the seminar are reported in this *Water Current*.

I have had the good fortune to travel to Central America, Western Europe (as we used to know it), England, and several north African countries. A number of countries are having problems with water supplies. Bottled or purified water was the norm and

that takes getting used to when we consider our consumption of water from many sources. When was the last time you used bottled water for your toothbrush? We will continue to learn what not to do with our environment and water resources by examining the many problems of other countries.

We, in North America, have an abundant, clean, safe water supply for ourselves and animals and that is the way we want it. The many safeguards that are in place to protect our water from many sources of contamination are vital to continuing this situation. However, we must be sure that drinking water standards are always based on sound scientific evidence and not on fear and perception. The question is how much risk are we willing to take? The U. S. Environmental Protection Agency prefers to err, when setting drinking water standards, on the safe side and that is often a judgment call when data for setting those standards is lacking or suspect.

The cost to communities to begin much more water testing in the future is of great concern. The resources are not unlimited. Therefore, we must insist that the water quality standards are backed with the best possible evidence.

On a different subject, again this year the University faculty have opportunities to apply for numerous grants from several government agencies. We, in the Water Center/Environmental Programs, are attempting to keep everyone informed of those chances for additional support and to help in the application process where possible. In Nebraska, water quality and water quantity are important issues and we need to continue to advance our research and educational programs. Best wishes for the new year. ☺

Argentina, Brazil Toured by Group from Nebraska

An agricultural tour to Argentina and Brazil led by Les Sheffield, University of Nebraska-Lincoln extension farm management specialist, took 28 Nebraskans from last winter's cold to the warmth of summer in South America.

They visited farms and ranches (estancias in Argentina, fazendas in Brazil), the Iguazu Falls, one side in each country, and the Itaipu Dam on the Parana River on the border between Brazil and Paraguay. This dam is the largest hydro-electric power generation dam (12,500 megawatts) in the world.

While in Buenos Aires, a city of 9 million people, with one-third of the population of Argentina, Michael Fay, assistant agricultural counselor with the U.S. Embassy in Argentina, briefed the group on Argentina's agriculture.

The main crops in Argentina are wheat, corn, soybeans, sunflowers, and alfalfa.

At Pergamino, in Buenos Aires province, they visited the heart of the corn-soybean production area. At a special lunch, officials of the Rural Society of Pergamino, explained their program. The National Institute of Agricultural Technology at Pergamino, and the Agricultural Research station, Cargill's large seed processing facility, and a farm implement dealership were also visited.

An outstanding sight in Brazil was the Iguazu Falls area, water falls that dwarf the Niagara Falls. About these falls Mrs. Theodore Roosevelt said, "Niagara Falls looked like a leaky faucet in their comparison," according to reports from Sheffield.

A stop at the largest city in Brazil, Sao Paulo, was followed by Campinas and a chance to observe agriculture, which included corn, soybeans, alfalfa, and Zebu



(see page 5)



Itaipu Dam on the Parana River: the left side is Brazil; the right side, Paraguay. This is the largest hydro-electric power generation dam in the world.

(Photo by Tom Sheffield—E.T.V.)

Pat Larsen
Writer and Editor
Chris Grant
Editorial Assistant

Published by the University of Nebraska
Water Center/Environmental Programs
103 Natural Resources Hall
P.O. Box 830844
Lincoln, NE 68583-0844
Phone: (402) 472-3305
Fax: (402) 472-3574

Bob G. Volk, Director
Roy F. Spalding, Associate Director and
Water Sciences Laboratory Director
Edward F. Vitzthum, Coordinator of
Environmental Programs
Robert D. Kuzelka, Assistant to the Director

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UNL Environmental Specialists Impressed by Hungarians

BUDAPEST, Hungary—Whether the arrival was by hydrofoil on the Danube River or by auto from Czechoslovakia, five University of Nebraska-Lincoln environmental specialists were charmed by the beauty and vitality of Budapest during visits in May and June of 1992. More importantly, they were impressed by the strong environmental concerns and commitments of the Hungarians they met.

The visits to Hungary of Istvan Bogardi, William Kelly, Robert Kuzelka, Mohammed Dahab, and Susan Miller were part of a three-year program initiated in January 1992 at the University of Nebraska-Lincoln. The U.S. Information Agency (U.S.I.A.) made a program grant on integrating engineering, the humanities and the social sciences to prevent environmental degradation. Grant recipients are UNL and in Hungary the Eotvos Lorand University of Sciences and the Center for Regional Studies of the Hungarian Academy of Sciences.

The program is directed by UNL Professors Istvan Bogardi of Civil Engineering and Ivan Volgyes of Political Science—both Budapest natives.

Phase one of the program began in the UNL 1992 Spring semester when an interdisciplinary graduate course was held on an interdisciplinary view of environmen-

tal problems. Experts from Nebraska and Hungary lectured on environmental issues ranging from problems on the Platte and Danube Rivers to global climate change. In the second phase of the program the UNL staff members gave seminars and participated in direct consultations in Budapest.

William Kelly, chairman of the UNL Department of Civil Engineering, held seminars on groundwater protection, solid and hazardous waste management and environmental engineering education at the Hungarian Ministry of the Environment. During the seminar discussions many of the questions raised by the Hungarians were similar to those asked in the U.S. and Nebraska.

For example, the concern on groundwater protection, was how well one could predict contamination and thus design protection strategies. In the solid waste area, the main concern was closing out and covering old landfills. There also was interest in video tapes that could be used for training.

answer to page 1
Jaroslav Vrba


(see story below)

The highlight of Dr. Kelly's visit was an opportunity to visit the Aszod Hazardous Waste facility which may be one of the most advanced in the world. Here the Class I hazardous wastes are encapsulated in concrete in above ground storage units. The concept appears to be similar to that proposed for low-level radioactive waste in Nebraska.

Unfortunately, although disposal costs are low by U.S. standards, they appear to be too high for Hungarian industries at this time.

Two joint presentations were made by Robert Kuzelka, assistant to the director of the University of Nebraska Water Center/Environmental Programs, and Susan Miller, assistant to the Dean of International Programs in the UNL Institute of Agriculture and Natural Resources. Both covered the development and enforcement of environmental policy in the USA and Nebraska.

Their seminar at the Hungarian Ministry of Environment concentrated on policy at the various levels of government. Special mention was made of the Nebraska system of regional natural resource districts and their role in environmental matters. This system was of particular interest to the rural officials in attendance.

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Czech Water Scientists Enumerate Contamination Problems

by Pat Larsen

PRAGUE, Czechoslovakia—One of the largest water and soil contamination problems in Czechoslovakia involves nearly 190 sites formerly occupied by the Soviets, according to a hydrologist who spoke in Lincoln two years ago. He provided up-to-date information on the situation in an interview in Prague in July.

Jaroslav Vrba, hydrologist with a private consulting firm, was a North Atlantic Treaty Organization (NATO) workshop participant in Lincoln in September 1990. As the University of Nebraska Avery Lecturer and as a presenter at the NATO workshop, he expressed concern about the former Soviet-occupied site clean-up challenge and of the 30 percent of all community drinking water wells that "weren't safe."

Between 87,000 and 120,000 Soviet soldiers occupied areas and dumped oil hydrocarbons, gasoline and kerosene into the soil. They then constructed landfills and covered them with small trees. Vrba said these landfills have been discovered by infra-red, aerial photography.

"During 1986 and 1987 it's estimated that about 48,000 tons of oil was dumped into water supplies in Czechoslovakia—the equivalent of the country's annual petroleum production," Vrba said.

"In fact, a government official even found diesel oil in his bathtub water, which was

proof-positive we had a serious problem."

He said it would take two or three years to clean up these sites. Soviet damages to churches, villages, forestry, soil and water could last for years, however. An example of Soviet carelessness was their using water-quality bore holes for latrines, Vrba said.

Vrba said, "One of the activities that significantly promotes water-protection management is groundwater monitoring." He said the Czechoslovak national groundwater-quantity monitoring network, including the observation of water levels in boreholes, has been in operation since the 1930s.

However, in the early 1980s, the increasing impact of human activities on groundwater systems led to the design and construction of a national groundwater-quality monitoring network.

"The national groundwater-monitoring program is coordinated with surface water, climate, precipitation, and partly, soil-monitoring networks," Vrba added.

A regional monitoring system for shallow, vulnerable aquifers in the fluvial deposits of the Elbe River in Bohemia has been in operation since 1982, he said. This regional monitoring system covers land having a 1,000-year farming tradition and is one of Bohemia's most fertile regions. The region is densely populated with intensive agricultural activities, mainly crop-

growing on arable land.

Vrba pointed out that, historically, in fact in the 15th Century, an extensive system of ponds and basins was established in southern Bohemia to control surface runoff, reduce the frequency of floods and lessen the extent of wetlands.

And even during the Middle Ages, the seasonal fluctuations of water and its irregular distribution led to the construction of large water-management projects.


However, the application of ever greater doses of fertilizers to farmland has resulted in conflicts between the agricultural sector and water users in many regions.

"Diffuse nitrate pollution of groundwater has been recognized to be one of the most serious impacts of farming activities on groundwater systems, in particular on shallow aquifers," Vrba said.

"During the past 30 years, nitrate contents in groundwater under cultivated, arable land have doubled, as have cereal yields, while the amount of fertilizer applied has grown nearly eight-fold," he said.

A federal water law enacted in 1973 in Czechoslovakia legislates three types of water instead of the usual two types in the U.S.—ground and surface water.

They have a third water designation: "Special" which includes mineral, curative, and mine waters found in the many spas

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Foreign Influences on Nebraska Water Law

by J. David Aiken

*Water and Agricultural Law Specialist
Department of Agricultural Economics
University of Nebraska-Lincoln*

While Nebraska water laws are unique, they have been influenced to a limited extent by the development of water laws in other countries, notably England. England is the source of the riparian right doctrine, which was the law governing Nebraska streams from territorial days until the 1890s.

In the 1890s the Nebraska Legislature, through a series of statutes, adopted the doctrine of prior appropriation ("first in time is first in right"), which some argue may have Mexican origins. The "reasonable use" portion of Nebraska groundwater law is based on Massachusetts court decisions, while the correlative rights aspect of Nebraska groundwater law is based on California court decisions.

Surface Water Law. Nebraska's surface water was originally directly based on English court decisions. Under the "riparian doctrine," every landowner owning land bordering a stream had a more or less equal right to use the water as it passed by his land. **Ripa** is Latin for stream, and water rights under the riparian system are based on owning land bordering the stream. Those whose land does not border the stream generally cannot acquire rights to use water.

The riparian rights doctrine was originally developed through English court decisions, although there are French and Roman legal precedents as well. The English "natural flow" version of the riparian rights doctrine prohibited diversions of water from the stream if they would interfere with downstream mills. Under the American "reasonable use" theory of the riparian rights doctrine, water diversions could be authorized if the diversions were "reasonable" in light of the competing needs of other riparian landowners.

Appropriation water law was first adopted by courts in Colorado and California. However, early court decisions suggest that the appropriation doctrine may have been practiced earlier in Mexico and perhaps also in Spain. Appropriation differed significantly from English riparian rights theory because water was scarce in the West rather than relatively abundant as in England.

Under the appropriation doctrine, water rights are acquired by diverting water from the stream and using it, rather than owning riparian land. Water may be used on non-riparian land under the appropriation system. Now state permits are required to appropriate water, a practice first implemented in Wyoming. Nebraska's 1895 appropriation statutes were adapted from Wyoming's earlier appropriation administration statutes.

Groundwater Law. Nebraska's ground-



David Aiken

water law is based upon American state court decisions rather than foreign legal precedents. English common law, that groundwater is considered to belong to the owner of the overlying land, was originally adopted in several eastern and western states. This "absolute ownership" theory

of groundwater rights was judicially rejected in Nebraska in 1933, the Nebraska Supreme Court's first groundwater rights decision.

Only Texas among the western states still follows the English absolute ownership rule. While many Nebraska landowners continue to believe that they legally "own" the groundwater under their land, the Nebraska Supreme Court has ruled in numerous decisions that landowners have the right to use groundwater reasonably on their own land, but do not own the water itself.

The Nebraska Supreme Court has also indicated that during shortages, groundwater users will proportionally reduce their withdrawals rather than have water allocated to the oldest well, as would happen under the appropriation system.

As this brief survey has indicated, Nebraska ground and surface water law differ markedly in their origins, with Nebraska surface water law of English and perhaps Mexican and Spanish origins and groundwater law of American origin. While the foreign influences on Nebraska water law have not been dominant, they are a part of our legal history. ♪

Trade, Environment, and Development, Tied Together in U.S. Trade Policy

Brad Bobertz, new faculty member in the College of Law at the University of Nebraska-Lincoln, says for the past 20 years environmental policy has been viewed as a field of its own.

"This interpretation has led to the misconception that environmental control is inherently separate from economic development and trade policy," Bobertz, formerly with the Environmental Law Institute in Washington, D. C., said.

For example, Bobertz told a November meeting of the Nebraska Chapter of the Society for International Development (SID), during the last two decades, environmental regulators have attempted "simply to control pollution at the end of the pipe or the top of the smokestack, instead of looking for ways to prevent the generation of pollution in the first place."

This has begun to change, Bobertz said, as the Environmental Protection Agency (EPA), and environmentalists "have started thinking more creatively about how pollution is created and how it can be prevented."

Bobertz recently visited an area of Poland, Czechoslovakia, and Hungary, called the "Triangle of Death" where there are high levels of water and air pollution.

"The extraordinary degree of environmental degradation in the former Soviet bloc countries shows what can happen when economic development is pursued without accompanying protection of the environment," Bobertz said.

Now, he said, these countries are setting standards for the environment to be considered along with development and trade policies.

Bobertz said, "By incorporating environmental considerations into our emerging trade policies, the United States can play a leading role in putting the concept of sustainable development into practice."

SID meets monthly, according to Bob McGeorge, president of the Nebraska association that has national headquarters in Washington, D.C. McGeorge, who has appointments in the College of Law and the Department of Agricultural Economics, invites interested persons to the December 8th meeting. It will feature holiday celebrations of different countries.

For more information about SID, call the International Programs Division, Institute of Agriculture and Natural Resources, the University of Nebraska-Lincoln, (402) 472-2758. ♪

Slovakian Grad Student Studies Aquaculture Here; Wants to Establish Fish Farm in Czechoslovakia

Ivan Bielik of Zilina, Czechoslovakia, wants to complete a Master's of Science degree in the Department of Forestry, Fisheries and Wildlife at University of Nebraska-Lincoln. Then he will return to his home to establish a fresh water fish farm and develop fish food from natural aquatic organisms.

Bielik's research here, with Terrence B. Kayes his major professor, is fisheries-aquaculture, with a walleye project at the State Fish Hatchery in North Platte. He said that walleyes are a sensitive fish that need high quality water in clean lakes.

"Carp are more prominent in Czechoslovakia. In fact, they are a special Christmas dinner dish, but are less sensitive environmentally."

Bielik's undergraduate degree is from the University of Agriculture in Bruno, Czechoslovakia where his major was Fisheries and Water Protection. However, he received an engineering degree in animal husbandry with a specialization in "fisheries."

He said a five-year undergraduate degree in Czechoslovakia requires a thesis and a final state examination. His thesis was titled "Dynamics of Natural Fish Food Development in the Dyje River Downstream of a Large Water Reservoir."

Only the University of Agriculture at Bruno offers advanced degrees in fisheries. According to Bielik, "The University of Nebraska has a much larger library with worldwide and U.S. sources for research, and more research possibilities because of its abundant water and outstanding faculty. The new program in aquaculture at UNL was also a factor that attracted me to UNL."

How did Bielik discover Nebraska?

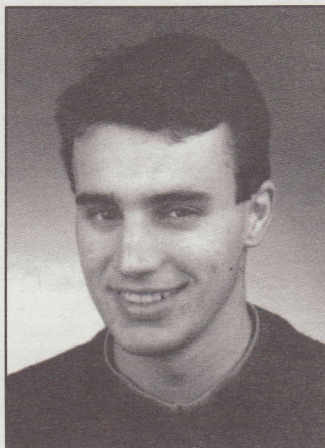
"I was driving through the Midwest on the way to California for a new practicum with the University of Minnesota Extension Service Student Agriculture Trainee Program (MAST) for international students, stopped at Lake McConuaghy, and heard about the speciality of aquaculture at UNL."

While in the MAST program, Bielik was also in an eight-month practical training program at a dairy in Princeton, Minn.; the academic program as a full-time student was in the College of Agriculture at the University of Minnesota.

His practical training in production horticulture with MAST was at a St. Paul, MN greenhouse, and in viticulture in a San Jose, Calif., winery.

Bielik's earlier background while in secondary school includes experience on the 3,100-acre school farm that raised cattle, sheep, poultry and horses with summer employment on fish farms. Nine months of his study at the Agricultural University of Brno, was also on the university farm.

"While in Nebraska I have an opportunity to learn about fish-related technology in the U.S., as here there is more freedom for



Ivan Bielik

educational advancement," Bielik said.

(Editor's note: Bielik said many Czechoslovakian students who are competent farm workers, are interested in employment on Nebraska farms for board and room in order to learn English and modern farm techniques.)

(Seminar—from page 1)

venture of the UNL Departments of Civil Engineering and Political Science. Other speakers have been invited from Slovakia, Turkey, the U.S., UNL, and Nebraska. These professionals will provide a comprehensive examination and information exchange on global water issues.

The weekly seminars are open to the interested public and are presented in order to bring together undergraduate and graduate students from various disciplines

(Argentina—page 2)

cattle. Then on to Carborundum-Brazil, which has a licensing agreement with Nebraska's Lindsay Manufacturing Co., to manufacture center pivots in Brazil.

After a stop at Brasilia, a new irrigation project at Paracatu with 45 center pivots was visited. Here soybeans and alfalfa are produced under intensive irrigation. The government of Brazil and private Japanese interests, fund this operation. Another stop was at a large farmer-cooperative at Paracatu which owns grain elevators, and operates a milk processing plant and a grocery store.

During the visit to Argentina, two owners of an agricultural-irrigation consulting firm, Enrique Jenichen and Jose Salas, both of Buenos Aires, accompanied the tour group during the bus travels to Pergamino. They had arranged the tour stops enroute to Pergamino that included a visit to "La Lucila", a very large estancia where corn, soybeans, wheat, alfalfa, beef cattle, and polo ponies are grown.

Jenichen and Salas have visited Nebraska several times as they have commercial ties with two irrigation equipment firms. The Sheffields have also hosted them in their home on several occasions.

to examine water issues. It is available for one-hour credit to registered UNL students.

Beginning Jan. 13, 1993, the hour-long seminars will be on Wednesdays at 3:30 p.m., in the East Campus Union, room to be posted.

More information and a detailed seminar schedule is available from the University of Nebraska Water Center/Environmental Programs, phone (402) 472-3305.

Annual Nebraska Water Conference Moves to North Platte for March Centennial Celebration

The centennial of the founding of the Nebraska State Irrigation Association will be observed when the annual Nebraska Water Conference moves from Lincoln in 1993. The event will be at the North Platte Holiday Inn Convention Center on March 16th and 17th.

Three conference themes related to irrigation and water development in Nebraska are reflections of the past, challenges of today and changes in the future.

Setting the centennial mood for the conference will be two opening addresses: noted historian Bob Manley will relive a "1893" conference keynote speech; and former University of Nebraska-Lincoln Vice Chancellor Duane Acker will propose a speech that would open the "2093" conference.

The past will be reviewed by authors of the book *Flat Water: A History of Nebraska and Its Water*, published for the conference and provided to all registered attendees.

The challenges of 1993 will be described by an economist, a wildlife specialist and a water regulator. Their presentations will be discussed by a panel of former Nebraska governors including Bob Crosby and Frank Morrison.

The future's expected changes will be envisioned by representatives of agricultural producers, financial institutions, governments, and citizen groups.

Conference registration material will be mailed in early January 1993. Information also may be obtained from the University of Nebraska Water Center/Environmental Programs. (Registration form on Page 11.)

'EARTH' with Nebraska Connections Trains Agriculturists

by Pat Larsen

GUACIMO, COSTA RICA — Learning to do by doing at a new university in Costa Rica may help solve some of Central America's and the world's problems, according to Jim French, academic director of Escuela de Agricultura de la Region Tropical Humeda (EARTH).

French, assistant director of EARTH, said, "If we can learn to manage rationally the resources of the humid tropics, this could be a great hope for the world's growing population."

He said the humid tropics account for about 7 percent of the earth's surface, 2,500 tree species and over 50 percent of the world's plant and animal species. The tropics constitute a reservoir of genetic material with an unknown potential for agriculture, forestry and medicine.

French, born in Lincoln, Neb., said this is an ideal location for the new educational facility in the lowlands of Costa Rica's Atlantic Region in Central America since the area is representative of the humid tropics.

EARTH has on-going technical support

from the Institute of Agriculture and Natural Resources at the University of Nebraska-Lincoln. California Polytechnic University is the lead institution. EARTH provides hands-on, academic training for 400 Caribbean students.

He said the graduates of the first class in 1994 will have the practical experience necessary to be agricultural extension staff members or entrepreneurs in their native countries.

Their technical expertise will be used to educate others in improved agricultural methods that will not be detrimental to the environment. These agents of change, who have questioned ways of doing things and will be the leaders of new farming practices, have been trained to make changes on their own farms or wherever they work.

"They will know how to change environmentally destructive farming methods in their home countries because they've done it themselves at EARTH," French said. "Besides this, the graduates will improve living conditions in their countries."

"Thanks to support of the Costa Rican government, the W.K. Kellogg Foundation

and the U.S. Agency for International Development, EARTH brought together business leaders, universities and students in its first class March 26, 1990," he said.

Glen Vollmar, dean and director of UNL's Institute of Agriculture and Natural Resources International Programs Division, said, "UNL has provided support in all institutional, administrative and academic areas as well as faculty and student services."

Other UNL faculty assisting include Ted Doane, Earl Ellington, Jim McShane, Osmond Gilbertson and Rick Foster.

Vollmar, UNL liaison to EARTH, said care will be taken to provide a balance of instruction in trisesters and cultural experiences so that EARTH will not "graduate classes of technocrats."

Richard Foster, UNL professor of agricultural education, who recently returned from a four-month appointment, said, "EARTH is becoming the premiere 'learning-by-doing' institution in the world."

While in Costa Rica, Foster assisted in faculty evaluation and orientation systems and helped establish liaisons and support networks to the secondary agricultural schools in Central America.

Students from Belize, Bolivia, Brazil, Colombia, Ecuador, Guatemala, Honduras, Nicaragua, Panama, Dominican Republic and Costa Rica are learning to manage the resources of the humid tropics. These students may be one of the hopes for feeding the growing population of the world, Foster said.

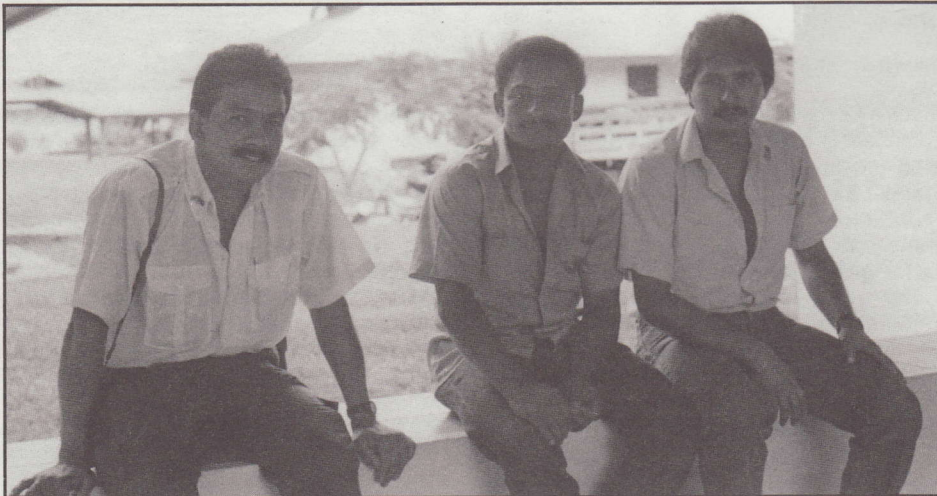
Besides academic training, EARTH's Continuing Education program is an important part of the college and the area. An example is the January, 1992, pesticide applicators' training program for the 65 Peace Corps members and area residents who work with the Peace Corps in Costa Rica. Area health-care professionals receive computer training in EARTH's up-to-date computer laboratory.

Vollmar said EARTH's mission is to contribute to sustainable agricultural development and natural resources management that will be unique and responsible in the humid tropics through education, applied research and outreach.

Bananas, coffee, beans, rice, sugar cane, pineapple and casaba (yucca), are the main crops in this area. Beef cattle are raised throughout the country.

The college maintains a 2,500-hectare commercial farm, a herd of 2,000 Brahma cattle, a 500-hectare forest preserve, and a banana plantation to provide practical training and to supplement its income.

Vollmar said it is hoped that education provided through EARTH will have a positive influence on changing farming and grazing practices that have caused massive deforestation, soil erosion and poverty along with an economy that has been depressed. ♪



Upper photo: Central American students at EARTH.

Lower photo: Storm clouds gather over EARTH campus in Costa Rica.

(Photos by Pat Larsen.)



La Mancha Plateau Aquifer Stressed by Intensive Irrigation

Although "the rain in Spain falls mainly on the plain," that plain, or plateau, especially the western La Mancha plateau, underlain by the La Mancha aquifer, is being depleted at a rate of 1.1 meters per year, according to a University of Nebraska-Lincoln agronomist.

And not only is the aquifer being depleted, but recent studies show the groundwater in the western La Mancha aquifer in Spain has nitrate contents ranging from 20 to over 50 parts per million (ppm).

Stephen Mason, UNL Agronomy Department, was in Zaragoza, Spain in 1991-92 for a faculty development leave. Zaragoza is in the Aragon Province in northern Spain. His experiences were featured at the Institute of Agriculture and Natural Resources (IANR) International Programs Division, International Eye Opener breakfast November 19.

This breakfast meeting is part of a series presented by IANR faculty who travel and do international research. They share their experiences with other faculty, staff, and interested persons.

In Spain, with a population of 39 million, 4 million persons are employed in agriculture. Eighty-six percent of the farms are less than 20 hectares in size. Of the 49 million hectares land region in Spain, 3 mil-

lion are under irrigation; 16 million are arable with 5 million hectares in permanent crops and 10 million hectares in permanent pasture.

Forest accounts for 15 million hectares in this mountainous country sometimes called "the Switzerland of Southern Europe" because of its five mountain ranges and ideal skiing conditions.


Mason's research in Spain was on the emergence potential of sorghum in crusted soils. "Grain sorghum is being considered as an alternate crop to replace maize in marginally irrigated areas," Mason said, "but stand establishment of sorghum is difficult due to the severe crusting potential of many soils in this area."


The main crops of Spain include: barley, olives, wheat, vineyards, sunflowers, fruit trees, maize, citrus and alfalfa, with grain sorghum the least produced crop. Incidentally, maize, (corn) is grown primarily for swine feed in Spain.

Citrus and vegetables are the largest agrofood exports of Spain. Processed fruit and wine follow with grain and olive oil about 7 percent each of the total exports.

The main agrofood imports to Spain include: animal products and meat, timber and coal, oil seeds, pelts and hides, coffee, tea, cacao, alcoholic beverages and to-

bacco. Seventeen percent of these imports come from the U.S.

For more information about Mason's research in Spain, an Agronomy Department seminar will be presented by Mason February 12. 

(Specialists—from page 3) 

Emphasis was on the environmental impact and regulation of agricultural chemicals at their consultation with "AGROTEAM," an agribusiness consulting firm. The audience for this meeting included a wide range of agriculture consultants and representatives of agricultural product trade organizations.

The discussions at the meetings of Kuzelka and Miller revealed the many similarities in both countries' environmental concerns and problems. The Hungarians are anxious to set environmental standards in all areas, especially agriculture.

Mohamed Dahab, professor of Civil Engineering at UNL, conducted a seminar at the Hungarian Ministry of the Environment for government employees. The principal focus of his presentation was nitrate reduction and removal technologies.


Various technical and cost data from treatment systems in the United States and western Europe were shown. Judging from the seminar discussions, there seemed to be a great deal of interest in this problem. It was clearly indicated that nitrate contamination was gradually becoming a problem in Hungary and there was no organized effort to combat this contamination.


A consultation by Dr. Dahab was held at the Hungarian Central Enterprise for the Organization of Agriculture and Food Industry. This quasi-public organization is engaged in the world-wide development and promotion of Hungarian agriculture and food industry. Here the focus was on methods preventing nitrate contamination and risk management of nitrate-contaminated water supplies. Again, judging from the amount of discussion, there is interest and recognition of the potential impacts of this contamination problem.

In summarizing the success of these visits, Professor Bogardi observes there is tremendous desire by the transitional Hungarian society for cooperation with Nebraska. This cooperation is most appropriate since climatic and topographic conditions are similar in the two countries.

Nebraska has great potential to establish scientific and business cooperation in several areas of agribusiness including farm management, agricultural financing, and banking systems, Bogardi said.

Interested persons are encouraged to contact Dr. Bogardi or Bob Kuzelka at the University of Nebraska Water Center/Environmental Programs.

(This article was written by Istvan Bogardi, Mohamed Dahab, William Kelly, and Robert Kuzelka.) 

(Czech Scientists—from page 3) 

in the country that are known for healthful mineral waters. Under this law, groundwater is mostly used for drinking purposes.

Furthermore, water legislation in Bohemia has a long tradition dating back to King Vladislav's Land Constitution of 1500, which was based on Roman principle. It stated that since ancient times, "rivers have been a public commodity."

Groundwater was considered in the past as belonging to no one, and thus was available for anyone who was legally entitled, or the respective landowner. However, the use of groundwater today cannot be claimed by land ownership; it is regulated by state authorities.

Groundwater resources are subject to protection, evaluation and registration. And as with other natural resources, the groundwater inventory is done by the State Commission for Classification of Natural Resources in this Eastern European country with a population of about 16 million. Its 127,871 square kilometers are located in the European watershed of the Northern Baltic and Black Seas.

Another water-expert interviewed in Czechoslovakia was Dr. Jan Silar, who is with the science faculty in the Department of Hydrogeology and Engineering Geology at Charles University in Prague.

Silar researched the Columbia Basin basalt aquifers in Washington state in 1969 while at the Washington Water Research

Center for a year.

Silar said there is no counterpart to the U.S. Cooperative Extension or Soil Conservation Service in Czechoslovakia to educate crop producers about farming practices that are potential groundwater-contamination problems.

"The Ministry of Environment is working on educational plans and regulations for types and amounts of commercial in-puts for farmers to use," Silar said.

"During the next 15 to 20 years we must educate citizens about wasting natural resources in Czechoslovakia," he said. "The past system lacked a general education about our resources."

However, before the Communist takeover in 1948, the Boy Scout movement educated youth about conservation of soil and water.

"We have to start over to persuade people conservation is not only important for our living standards, but for our future destiny."


Vrba and Silar predicted that in five years soil and water quality would be "much improved." However, to put contamination in the right perspective, five topics must be emphasized:

—Identify problems with public education and information,

—Legislation,

—Control with monitoring and sufficient data,

—Special experts, and

—Support of the people. 

Hungarian Researcher Says Their Nitrogen Fertilizer Use Down

In the past few years use of nitrogen and other fertilizers has decreased in Hungary, according to a Hungarian researcher who visited the University of Nebraska in October.

In fact, the nitrogen fertilizer supply system is going through a restructuring which has resulted in fewer sales recently, Mihály Szucs, of the Pannon Agricultural University told an Agronomy Department seminar.

"No one is buying fertilizer," he said. This is because of the uncertainty in land ownership. Following privatization of land, there may be another increase in fertilizer use.

In the early 1960s, collective farms began to increase fertilizer use. However, the collectives, which were as large as 5,000 hectares, had many animals in the villages, but no facilities for treating animal wastewater. Then agriculture was blamed for pollution, he said. And in the mid-70s,

opportunities arose for researching the pollution problems.

Cultivation in northwest Hungary, a research area of Szucs, (see map) consisted of 46 percent row crops, 34 percent cereals, and 20 percent pasture.

Some of the 540 soil profiles sampled were high in nitrates, particularly under corn cultivation, Szucs discovered in his research. He said there was a high content of nitrate and chloride in these samples that were taken to assess groundwater degradation.

Szucs researched farm soils in the 70s, did plot experiments in the 80s, and ground and surface waters studies in the 90s. He obtained additional data on point source pollution in 1992.

During the era of collective farms, "everyone tried to get the maximum yield," but now producers are definitely cutting back on nitrate fertilizer use.

He said some Hungarians are stressing organic farming to avoid excess nitrate in the soil and groundwater. However, manures may still pose a nitrate problem.

"In small villages there are many, many more problems with nitrates," Szucs said. He explained that there continues to be many farm animals, especially pigs. However, bottled, commercial water is supplied infants where nitrate exceeds health standards.

Szucs' trip to the U.S. brought him to the University of California at Davis, the University of Florida, and the University of Nebraska-Lincoln.

What's New?

A new book, **Groundwater Exploitation in the High Plains**, edited by Kansas State University geography professors David Kromm and Stephen White, is available in bookstores. The authors say this is the first published comprehensive study on groundwater use, technologies and management in the region.

The editors say there are several aspects that came out of the book that were related to how we can use less water.

A chapter on the Sandhills was written by Steve Gaul of the Nebraska Natural Resources Commission. Another, by Donald Green, dean of the College of Humanities and Social Sciences at Chadron State College, Chadron, Nebraska.

The University Press of Kansas published the book.

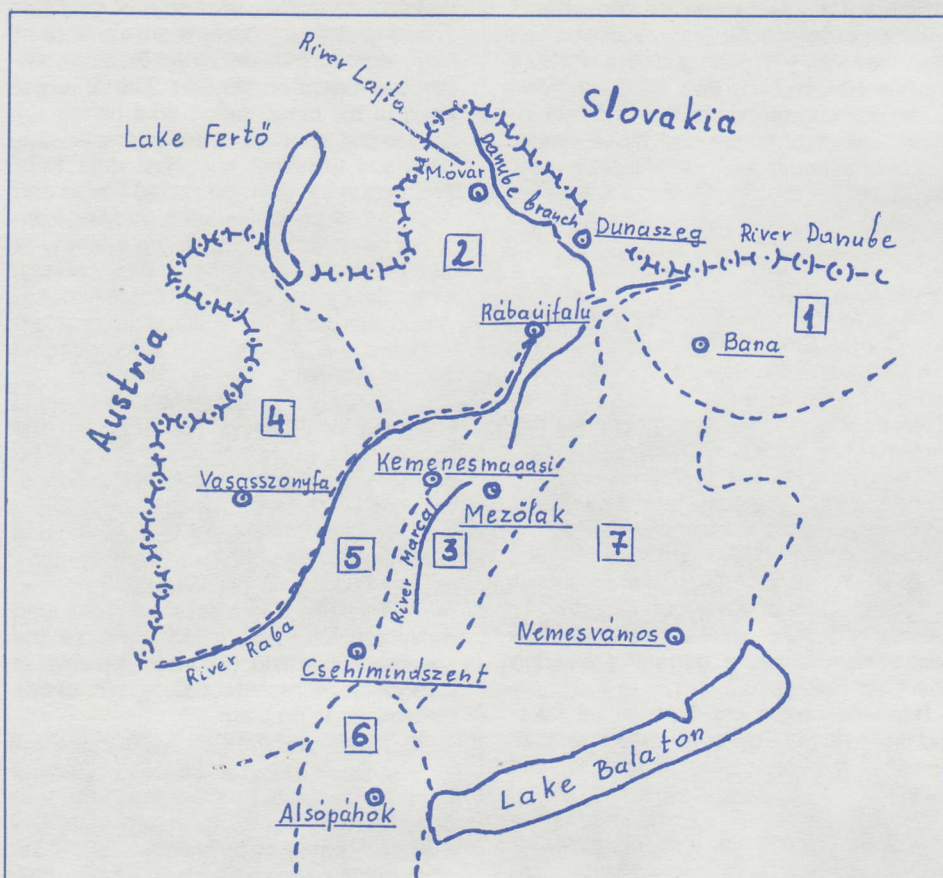
An easy-to-use groundwater reference guide of some of the nation's "best groundwater education materials" has been completed by the University of Michigan Biological Station (UMBS) in Pellston, Michigan.

Sixteen topics in this 26-page bibliography are for audiences that range from the general public to teachers and farmers. Title, author, type of publication, date, abstract, audience, and cost are included.

The first copy of the guide is free; additional copies are 75 cents each.

For your copy, contact UMBS, Pellston, MI 49769, (616) 539-8789.

"Drinking Water: Quality on Tap" is a new 27-minute video on drinking water issues. A 46-page study guide plus 100 informational brochures for handouts that accompanies the video are ideal for libraries, schools, community groups, environmental organizations, water utilities, and government agencies. Gary Sandy of the television series "WKRP in Cincinnati" is host for the video available from the Michigan League of Women Voters of Michigan.



The soil sampling sites and areas in Hungary.

1 - Terrace of Danube

2 - Basin of Győr and the Hanság marsh

3 - River Marcal basin

4 - Gravel sediments of the Rába river

5 - The Kemeles ridge

6 - Zala river hills

7 - The Bakony mount

(Map by Szucs.)

Irrigation Association Centennial Spawns State Water-History Chronicle

What began as an attempt to document the history of irrigation in Nebraska for the centennial of the founding of the State Irrigation Association has become a multi-author encyclopedia of Nebraska's water history. ***Flat Water: A History of Nebraska and Its Water***, published by the University of Nebraska-Lincoln Conservation and Survey Division, will be unveiled at the Nebraska Water Conference March 15-17, 1993, in North Platte.

Noted Nebraska historian Robert Manley is serving as contributing editor and consulting historian on the project. It was Manley who recommended development of a comprehensive account of water-related issues in Nebraska, according to Flat Water project leader Bob Kuzelka.

Kuzelka is assistant to the director of the Water Center/Environmental Programs. That organization is one of the sponsors of the Nebraska Water Conference.

Because water is fundamental to life and to nearly all environmental issues, by creating a chronicle of the state's water history, the value of this book should extend far beyond the people attending this conference, he added.

It should be noted that in some states, water use and development might be seen as incidental to the major issues that dominated a state's history, Kuzelka said. (Although as the environmental movement catches hold, more and more people appreciate how fundamental to and interwoven with daily life natural resources are.)

However, in Nebraska, perhaps second only to California, water development and use are central to the state's history and its future. In a predominantly agricultural economy in a semi-arid region where rainfall is often low, the wisest and best use of

water has been integral to its economic, cultural and environmental development, he noted.

In light of its fundamental status in the state's history, and as a result of Manley's recommendation and other planning regarding the book, another goal became providing a book that would be used in a variety of settings by a wide variety of audiences, Kuzelka explained. In addition to Manley's pre-1900 section, the book includes chapters on climate and hydrology, industry, technology, economics and finance, extension and education, changes in ecosystems, politics and policy, and a farm family.

This water history should be for the general public, as well as for an audience with a specific interest in irrigation in Nebraska, he explained. The resulting work could be used for casual reading or for reference, as it will be well indexed. It could be used in high schools and in higher education. As a chronicle of water-related events in a typical Great Plains state, it should have interest and value even beyond Nebraska. Finally, the book not only records the history of Nebraska and its water up to 1993, but provides six perspectives on water use and development in the future, he said.

One important example of the book's grass-roots inclusiveness is the chapter documenting a farm family that moves from dryland farming to surface water and then groundwater irrigation, Kuzelka said. Others are the chapter on politics and policy, which emphasizes the many constituencies that interacted, fought, compromised and forged alliances in dividing up the benefits from Nebraska's water, and the economics chapter, which makes it plain that water development was (and is) a matter

of intense financial concern to farm families, but also to anyone involved with or concerned about rural and small-town economies.

In addition, the endpiece (appendix) on native American use of water is more than a token display of sympathy for Indians, he said. It is an attempt to devote nearly another chapter to prehistoric people's uses of and relationships to water, as well as to chronicle the struggles they faced during the historical period as they lost their land and, with that loss, their unique adaptations to its semi-arid ecosystem.

"The project also has been at pains to include women," Kuzelka said. "In this regard, we have chapters from four women, sidebars from three other women, and an endpiece from another. We asked four more to write, but they had other commitments. We have also arranged for a sidebar on an elderly woman irrigator from near Burwell," he offered. Three biographical profiles on early female promoters of irrigation are excerpted from the 1896 and 1897 proceedings of the annual meeting of the State Irrigation Association.

Finally, Kuzelka explained, the history deals with the ecological changes resulting from water development and not just the development itself. It raises questions from environmental and ethical points of view. It asks, but does not attempt to answer, questions regarding our obligations to future generations of humans and to the non-human part of the biosphere.

(Reprinted from the *Conservation and Survey Division annual report, Resource Notes*, Vol. VI, 1991-92.)

(Conference registration form on page 11.)

Director of International Drought Info Center Receives Award

by Cheryl Alberts
IANR Newswriter

A University of Nebraska-Lincoln agricultural climatologist has received a prestigious national award as author of a paper related to drought and state government.

Donald A. Wilhite received the 1992 American Water Resources Association Boggess Award at the organization's 28th annual conference in Reno, Nev. on Nov. 4. The award is given to the author of the best paper to appear in the AWRA Water Resources Bulletin during the previous year.

Wilhite's paper, entitled "Planning for Drought: A Process for State Government," was published in the January/February 1991 issue. The research project leading up to this paper was supported by a grant from the National Science Foun-

dation. The 10-step process outlined in the paper also is becoming the basis for nations throughout the world to plan for drought.

Wilhite said he considers the award an honor, and is pleased that attention is focused on a topic as important as drought.

"Drought is a relative phenomena occurring in high and low rainfall areas," said Wilhite. "It is a normal part of climate. Policy makers think of it as unusual, but its recurrence is inevitable, as we have seen in the United States in recent years."

Wilhite's 10-step process helps state governments deal with drought before it occurs by developing contingency plans, rather than reacting to drought after it occurs. Wilhite said he and others have shown this reactive approach to be costly and inefficient. Wilhite has been working with Ne-


braska state government officials on drought-related issues since 1985.

"As population increases so does pressure on our limited natural resources," said Wilhite. "Thus vulnerability to drought increases. So it makes more sense that we plan for water shortages."

The impacts of droughts in the late 1980s and early 1990s in the United States have been in the tens of billions of dollars. In addition, the 1988 and 1989 droughts cost the federal government billions of taxpayer dollars for drought relief, said Wilhite. Money was often misdirected and often came too late.

"It was clear to me that states had to be better prepared," he observed. "The goal of the planning process is to develop a plan

 (see page 10)

(Director—from page 9) 

that will reduce drought impacts and vulnerability and, ultimately, the level of government intervention in the form of relief and other assistance programs."

The seed for the 10-step state plan was actually planted five years earlier, when Wilhite and William Easterling organized a three-day International Symposium on Drought, held at UNL. The symposium brought together about 150 people from 30 different countries. From that symposium emerged a 600-page book structuring the information amassed from the three-day symposium. "Planning for Drought" was co-edited by Wilhite and Easterling, also a UNL agricultural climatologist.


The last chapter of that book deals briefly with the drought-planning process. The paper Wilhite subsequently wrote "fleshes out" more specifically how states can prepare for drought. The 10-step plan is flexible, said Wilhite. Not every step needs to be implemented in every state; other states may find they already have some steps in place.

"The 10-step process is turning out to be a pretty good cookbook approach," Wilhite said. Twenty-seven states now have a plan.

The next task is to transfer this planning process to nations worldwide for adaptation to their particular situation. A modified version of this process has been developed by Wilhite for the United Nations Environment Program for distribution to developing countries. This guidebook should be available later this year.

Wilhite has edited several other books on drought and will complete a new book by the end of the year.

Wilhite is a professor of agricultural climatology in the Department of Agricultural Meteorology and Climatology at UNL's Institute of Agriculture and Natural Resources. He has been a member of the department since 1979. He is also director of the International Drought Information Center at UNL.

(A copy of the 10-step "Planning for Drought" can be obtained from Wilhite at 241 LWC, UNL, Lincoln, NE 68588-0728 or phone (402) 472-6707.) 



Dates to Use

Jan. 4-5, 1993, USDA, Soil Conservation Service, CROP Residue Management Conference, Des Moines, Ia., Convention Center, 20 workshops, trade show. Contact: (800) 927-4049.

Jan. 6-8, 1993, 1993 Annual Meeting of Four States Irrigation Council, Fort Collins, Co. Contact: Rich Johansen (402) 466-9517.

Jan. 13, 1993, the first of the weekly 1993 Water Resources Seminar series, "Global Perspectives on Water and the Environment," 3:30 p.m., UNL East Campus Union. Contact: Cindy LeGrande (402) 472-3305.

Jan. 15, 1993, deadline for USGS 104 water research proposals for FY 1993, due at Water Center/Environmental Programs.

Feb. 4-6, 1993, "Managing Riparian Areas: Common Threads and Shared Benefits," Albuquerque, NM. Contact: Water Resources Research Center, (602) 792-9591.

March 8-12, 1993, UCLA Extension short course, "Soil and Groundwater Remediation." Contact: UCLA Extension, (310) 825-1047.


March 9, 1993, Children's Groundwater Festival, Grand Island Central Community College. Contact: Kris Newcomb, (402) 434-2740.

March 15-17, 1993, Annual Nebraska Water Conference, North Platte Holiday Inn. Sponsored by the Nebraska Water Conference Council and the Nebraska Irrigation Association; the 100th anniversary of founding of Nebraska State Irrigation Association. Contact: Cindy LeGrande, (402) 472-3305.

April 20-22, 1993, National Agricultural Nutrient Management Conference, St. Louis, Mo., Clarion Hotel. Contact: (317) 494-9555.

May 15-21, 1993, U.S.A.-Russian Hydrology Conference, American Institute of Hydrology, Minneapolis; U.S. Geological Survey and the Russian Academy of Sciences. Contact: (612) 379-1030.

May 19-21, 1993, Sixth Symposium on Artificial Recharge of Groundwater, "Purpose, Problems, and Progress," Phoenix, AZ. Contact: (602) 792-9591.

May 24-June 4, 1993, North Atlantic Treaty Organization (NATO) Advanced Study Institute 1993, "Engineering Risk and Reliability in a Changing Physical Environment" will feature new developments in resources management with application to non-steady conditions, Hotel du Golf, Deauville, France. Contact: Lucien Duckstein, University of Arizona, (602) 621-2274. 

WATER CENTER/ENVIRONMENTAL PROGRAMS MAILING LIST UPDATE

We are updating our mailing list. If you have a change of title, name, and/or address, or would like to have your name added or removed from our list, please complete this form. If you know of anyone who might be interested in receiving our publications, please submit their name(s). Thank you.

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103 Natural Resources Hall UNL
P.O. Box 830844
Lincoln, NE 68583-0844
Phone: (402) 472-3305 FAX: (402) 472-3574

ADVANCE REGISTRATION FORM

1993 Nebraska Water Conference
Holiday Inn, North Platte, Nebraska
March 16-17, 1993

Please Fill Out One Form For Each Person. Copying Forms O.K.
Mail to: Les Sheffield (FAX: 402-472-3460)
304-B Filley Hall
University of Nebraska-Lincoln
Lincoln, NE 68583-0922 (Phone: 402-472-1773)



Option No.	Includes Following	Price/Person
1.	Full Registration for Both Days With 4 Meals And Coffee/juice Breaks (Includes Option 2 below)	\$90.00
2.	Copy of Book & Autograph Wine & Cheese Party, Mar. 15, 5-7 p.m. (Automatically Included in Both Options 1 & 3)	\$20.00
3.	March 16 Registration, 1 Lunch, 1 Dinner & Breaks	\$60.00
4.	March 17 Registration, 1 Breakfast, 1 Lunch & Breaks	\$50.00
5.	Registration Both Days, With Breaks, but No Meals	\$45.00
6.	March 16 Registration Only with Breaks, No Meals	\$40.00
7.	March 17 Registration Only with Breaks, No Meals	\$30.00
	Options 1-7 Includes a copy of Flat Water — A History of Nebraska and Its Waters	
8.	March 16 Luncheon Ticket Only	\$10.00
9.	March 16 Banquet Ticket Only	\$20.00
10.	March 17 Breakfast Ticket Only	\$10.00
11.	March 17 Luncheon Ticket Only	\$10.00
12.	A. Tour to Diversion Structure at Confluence of North & South Platte Rivers, CNPP&ID (Weather Permitting 2-3 p.m., March 17) B. Tour of Central Nebraska Public Power and Irrigation District Water Control Center, Gothenburg, 2:45 to 4:00 p.m., March 17 (Transportation on Your Own)	No Cost
13.	LATE REGISTRATION FEE (After March 10, 1993)	\$20.00

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LODGING REQUEST FORM: Holiday Inn, P.O. Box 430, North Platte, NE 69103
(MAIL BEFORE MARCH 5, 1993) (Phone: 308-532-9090 or 1-800-662-2965)
(Circle Choice of Room, either Standard or Pool-Side)

Convention Rates for 1993 Nebraska Water Conference		Pool-Side Room
____ Single Room, 1 Bed, 1 Person	\$42.00 Plus Tax	\$47.00 Plus Tax
____ Double Room, 2 Beds, 2 Persons	\$42.00 Plus Tax	\$47.00 Plus Tax
____ Room with King Bed for Couple	\$42.00 Plus Tax	\$47.00 Plus Tax

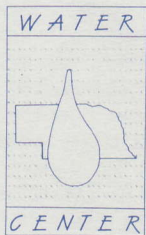
Name: _____ No. of Persons: _____

Address: _____, Town: _____ State: _____

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Arrival Time: Before 6:00 p.m. Guaranteed Arrival: Call 800 Number.



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