COLORADO WATER

Newsletter of the Colorado Water Resources Research Institute, Fort Collins, Colorado 80523

WATER ITEMS AND ISSUES . . .

September 1990

We Need Your Help
For a Survey of Water-Based Recreation!
(see centerfold)

CALLS FOR PAPERS

Colorado Water Engineering and Management Conference - Page 2
Water Project Development and Financing in the 1990s - Page 20

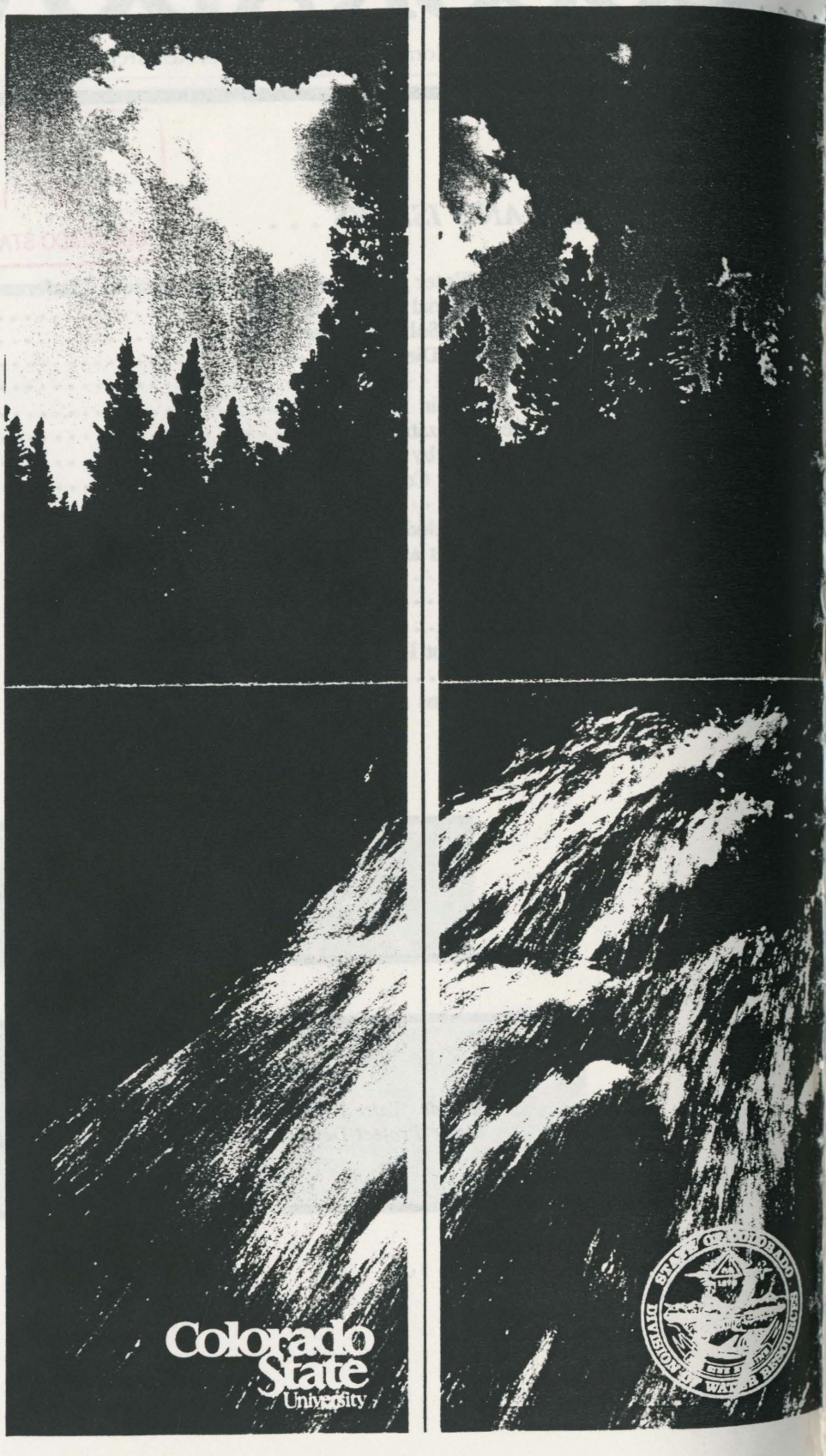
Colorado State University

Call For Papers

Colorado Water Engineering and Management Conference

February 27-28, 1991
Denver, Colorado

Organized by
Colorado Water Resources Research Institute and the Office of the State Engineer



Co-Sponsors

- American Water Resources Association, Colorado Section
- Bureau of Reclamation
- Colorado State University
  - Agricultural and Chemical Engineering Department
  - Agricultural Experiment Station
  - Civil Engineering Department
  - Colorado Institute for Irrigation Management
  - Cooperative Extension
  - International School for Water Resources
- Natural Resources Law Center, University of Colorado
- USGS WRD, Colorado District
- Wyoming Water Research Center, University of Wyoming

Conference Objective

The Colorado Water Resources Research Institute at Colorado State University and the Office of the State Engineer seek papers for the 1991 **Colorado Water Engineering and Management Conference.** The purpose of the Conference is to evaluate technical and management methods necessary to solve water problems in Colorado and the West. Western states are dependent on water management for economic and social development, and engineers and managers have key roles in water decision making. The Conference serves as a forum to exchange ideas about technological and management solutions for current state water problems and policies.

Who Should Attend

The Conference will be of interest to water resource engineers, water district managers, utility and municipal officials, agricultural and industrial water managers, public officials, and other citizens interested in the engineering and managerial aspects of water management.

Conference Topics

- Water Resources Management and Problem Solving
- Interstate Water Transfers
- Water Exchanges, Banking, Conjunctive Use
- Telecommunications and Computing in Water Management
- Flood and Stormwater Management
- Urban Water Supply
- Drought Planning
- Wastewater and Water Quality Issues
- Groundwater Management
- Climatic Issues
- Agricultural Water Management
- State Water Policy
- Western Water Issues
- Regionalization of Water Management
- Water Management Technologies
- Water Conservation

To Submit a Paper for Consideration

Send a brief abstract by **November 1, 1990** to:
Neil S. Grigg, Director
Water Resources Research Institute
Colorado State University
Fort Collins, CO 80523
Telephone: (303) 491-6308
FAX: (303) 491-2293

Abstracts should be single spaced with full names and mailing addresses of the author(s) following the title of the paper. Notification of acceptance of abstracts will be made by December 3, 1990. Five-page papers for preprinting in the Conference Proceedings will be due January 11, 1991. Proceedings will be available at the Conference. Authors are expected to pay the registration fee. To make program suggestions, contact Neil Grigg at above address.

Registration

There is an advance registration fee of $175.00 if registration is postmarked and paid by 5:00 p.m., February 6, 1991. The fee for registrations received after that date or on site will be $200.00. There is a one-day registration fee of $100.00.

Refunds, less a handling charge of $40.00 will be made in the event of cancellation, provided the Office of Conference Services is notified by February 6, 1991. Substitution of participants is permitted. There is a $15.00 charge assessed on all returned checks.

The registration package includes one copy of the Conference Proceedings, lunches, reception, refreshments during breaks, and attendance at all sessions.

For general information, contact:
Janet Lee Montera, Manager
Civil Engineering Department
(Conference Section)
Colorado State University
Fort Collins, CO 80523, USA
Telephone: 303-491-7425
FAX: 303-491-7727

Water Resources Paper

These papers are a continuation of the "Hydrology Papers" series that was established by Dr. Vujica Yevjevich at Colorado State University.

Subscriptions and correspondence regarding these papers should be addressed to: Hydrology and Water Resources Program, Colorado State University, Engineering Research Center, Fort Collins, CO 80523, USA. Telephone: 303-491-8460; FAX: 303-491-8671.

REGISTRATION FORM
Colorado Water Engineering and Management Conference
February 27-28, 1991

Please print or type:

NAME(S) _____

ORGANIZATION _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

TELEPHONE _____

REGISTRATION FEE:

Postmarked by February 6, 1991 # ____ @ $175 = $ _____

Postmarked after February 6, 1991 # ____ @ $200 = $ _____

One-Day Registration Fee # ____ @ $100 = $ _____

TOTAL ENCLOSED = $ _____

METHOD OF PAYMENT:

☐ Check (payable to Colorado State University)
☐ Purchase Order/Training Form
☐ MasterCard Card # _____ Exp. Date _____
☐ VISA Card # _____ Exp. Date _____

Mail completed form with payment to Conference Services, Rockwell Hall, Colorado State University, Fort Collins, CO 80523.

MIDDLE EAST WATER ISSUES

Editorial

by
Neil S. Grigg

Saddam Hussein focused our attention on oil, politics, and aggression; but water, more than oil, means life to Middle Eastern peoples that live mostly on arid lands. Here at CSU, students from the region studying water resources provide a glimpse of Middle East water issues, and water could be more important than oil in their long-range future.

The Wall Street Journal on August 6 stated that "...the land between the Tigris and Euphrates has what most of the Middle East lacks - water." It went on to infer that the combination of water, land, and oil gives Saddam imperial ambitions, and his statements confirm that theory. On August 10 Saddam stated that "...Western imperialism has divided us, setting up small states to facilitate the task of occupying Arab land...". Of course, one way to solve some of their inter-regional problems, such as water, would be to create a super state with Saddam as the leader.

The Middle East has water conflicts that make ours in Colorado and the West look simple - at least we find solutions through legal means and policy processes, even if they are not always orderly. No such possibilities exist at the present time in the Middle East. A review of water conflicts in the region shows that Turkey has recently closed the gates on its new Ataturk Dam which impounds the Euphrates before it flows into Syria. Syria accesses the river before it flows into Iraq and eventually joins the Tigris just north of Kuwait at the traditional site of the Garden of Eden. I am aware of no compact to divide the waters between the states. Over near Israel the Jordan River flows along the Golan Heights down along the border between Israel and Jordan. Israel's refusal to give up the West Bank of the Jordan assures them access to the river in this zone. Up in Lebanon another river, the Litani, flows along a zone still controlled by Israel after their 1982 invasion of Lebanon. Israel ostensibly controls the region to create a buffer zone against attack, but control of the water is also an incentive, as any water manager knows. Rumor has it that Israel has also drilled wells in that region, but this is not confirmed.

In Egypt over 50 million people subsist on a thin strip of farmland comprising not much more than 6 million acres. With a growth rate of three percent each year they add 1.5 million mouths to feed. This land receives practically no precipitation and must be irrigated by the Nile River, a variable resource flowing into Egypt from the south. There is about one-eighth of an acre of farmland per person and the river's annual yield provides a little over one acre-foot per person annually. The importance of the Nile water is apparent. Egypt cannot be completely confident about future quantities of Nile water from upstream states.

How will the Middle East solve its water problems? I don't have the answer, but the education that students from the region receive in water resources will clearly go a long way toward giving them the tools they need, if they can work out the political difficulties. It's the same in Colorado: the technical solutions are at hand if the political puzzle can be solved.

COOPERATION, BALANCE ARE KEY TO SOLVING WATER CONFLICTS

GUNNISON- New efforts in cooperation and communication among Colorado's diverse water interests are essential for the future prosperity of Colorado, according to water experts attending the Fifteenth Annual Colorado Water Workshop at Western State College on July 22-24, 1990.

Dr. Neil S. Grigg, Director of Colorado Water Resources Research Institute in Fort Collins, warned that the conflicts and inadequacies of Colorado's water policy encourage the courts, the federal government and environmental organizations to step into the policy vacuum and make decisions. According to Grigg, "New institutional approaches to water resource planning and management are needed in Colorado." Grigg's recommendations include regional water management organizations and a statewide institution with the ability to plan and broker water supplies between regions.

Sarah Bates, author of **Overtapped Oasis: Reform or Revolution for Western Water** and attorney for the Sierra Club Legal Defense Fund, argued that increased public input is essential for the success of water management in Colorado. If the state's diverse public interests groups are not given a voice in water decisions, support for public trust doctrine will grow and the courts will increasingly make water policy decisions.

A number of speakers cited the need to recognize the value of water for the recreation economy in the state. Both Kevin Coyle of the lobbying group, American Rivers, and Bill Dvorak of Western River Guides suggested that recreationists are indeed willing to pay for the use of Colorado's waters if a fair method of payment is devised. Other Workshop speakers described the conflicts among instream flows for environmental protection and recreation, diversion and reservoir construction. Hubert Farbes, president of the Denver Water Board, discussed how Denver is attempting to address these conflicts through the development of a smaller alternative to Two Forks Dam which includes the environmental mitigation. Rich Moy, Chief of Montana's Water Management Bureau, described the intricate planning process his state has developed to ensure all parties have input into water decisions.

Most of the more than 40 speakers agreed that Colorado would benefit from a process for coordinating water needs in the state. However, Gunnison rancher Ken Spann cautioned that solutions to Colorado's conflicts must not be developed by "bureaucrats who have lost touch with the land," and Keith Propst of the Colorado Farm Bureau stressed the importance of protecting private property rights.

Over 220 people attended this year's conference. The Colorado Water Workshop was established at Western State College in 1975. Its purpose is to further public understanding of critical water resource issues in Colorado and the arid West.

Key sponsors of the Workshop include American Water Development, the City of Aurora, the City of Gunnison, the Colorado Division of Wildlife, the Colorado River Water Conservation District, the Denver Water Department and the Southwestern Water Conservation District.

NOTED WATER-RESOURCES EDUCATOR DIES

Dr. Warren A. Hall, known worldwide for his active involvement in water-resources research and education, died in Aurora, Colorado on June 24 of an apparent heart attack.

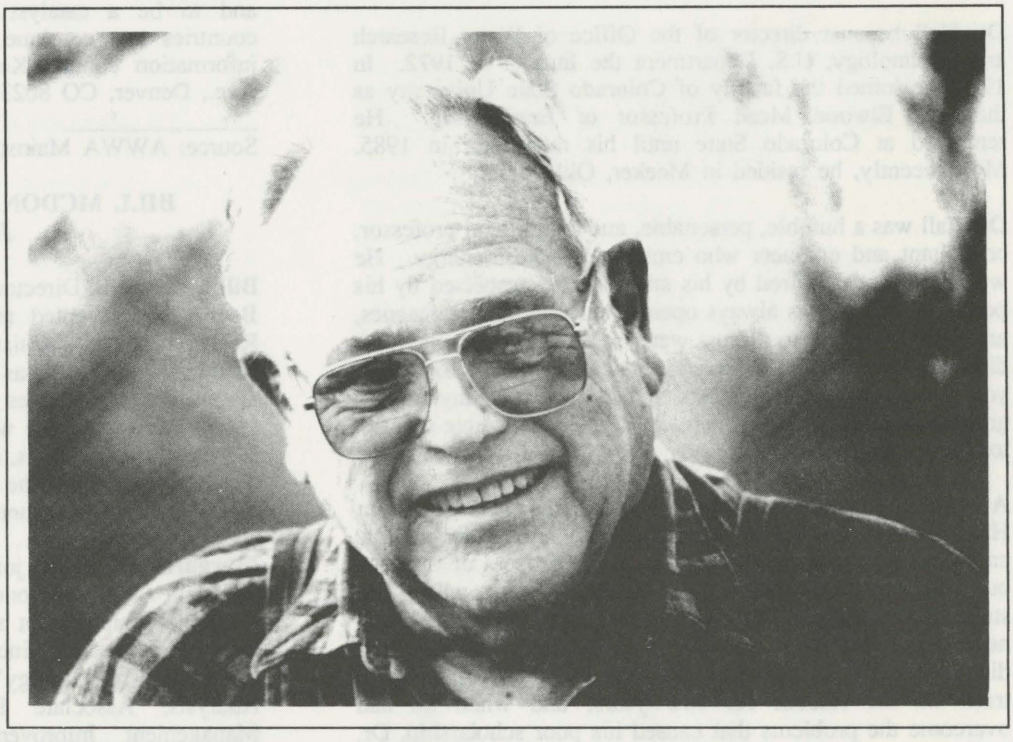


Photo taken April 1990 by Dr. Hall's granddaughter, Lianne Tauxe, at Hall's farm in Oklahoma.

Dr. Hall, who unpretentiously introduced himself as Mr. Hall or Warren, was born Aug. 12, 1919 and raised on a dryland farm near Crawford, Nebraska. He earned a bachelor's degree in engineering from the California Institute of Technology in 1942 and followed that with a tour as an industrial relations officer for the U.S. Navy during World War II. Shortly afterwards, he began a distinguished career with the University of California.

He received a doctorate from the University of California, Los Angeles in 1952. His pioneering ideas in education, which involved eliminating departmentalization in academics, led to his appointment as Assistant Dean for Undergraduate Studies in the College of Engineering at UCLA. He was in charge of curriculum development and the administration of undergraduate degrees.

In 1960, as the nation began to feel the necessity for in-depth research of its water needs and resources, Dr. Hall was selected as Director of the Water Resources Center, which involved all campuses of the University of California. Under his direction, the center approached water-resources from a broad point of view with participation by the social and physical sciences.

But, faculty interested in water resources were relatively isolated--a small number of individuals scattered through many departments and universities--with no means of exploration or action on matters of mutual concern. Dr. Hall provided the catalyst for that action. He convened two conferences that resulted in the creation of the Universities' Council on Water Resources. During its formative years, Dr. Hall served as a member of the board of directors, as executive secretary and as chairman. Today, this organization is recognized throughout the world as the authoritative voice on matters of water-resources research and education.

Ever interested in new challenges, Dr. Hall accepted in 1966 the task of directing the University of California's Dry Land Research Institute in Riverside. Hall concentrated on a program that demonstrated production of corn, sorghum and even peaches in the midst of a desert of creosote brush. His water-resources research and his interest in agriculture lead to unique contributions in reservoir management and irrigation-systems control. He applied these skills to many consulting assignments in other countries including India, Iraq, Brazil, Peru and Chile.

Dr. Hall pioneered the introduction of systems analysis and multi-objective tradeoff analysis in water-resources planning and management. In 1971, he was co-author of an internationally recognized textbook on that subject.

The federal government has a habit of borrowing the best talents of the states and Dr. Hall was in great demand. Richard Nixon appointed Dr. Hall to be Technical Assistant for Water Resources, Office of Science and Technology, Executive Office of the President. He also served as chairman of the Committee on Water Resources Research of the Federal Council on Science and Technology, and as a member of the President's Task Group on the Great Lakes and the Joint U.S.-Canadian Working Group on the Great Lakes.

Dr. Hall became director of the Office of Water Research and Technology, U.S. Department the Interior in 1972. In 1974, he joined the faculty of Colorado State University as the first Elwood Mead Professor of Engineering. He remained at Colorado State until his retirement in 1985. Most recently, he resided in Meeker, Oklahoma.

Dr. Hall was a humble, personable, and resourceful professor, consultant and engineer who emanated endless energy. He was loved and admired by his students and respected by his peers. His door was always open to students and colleagues, and his enthusiasm to discuss water-resources problems never diminished. Dr. Hall served as a key mentor for many young scientists and engineers and as host to many foreign graduate students. His generosity of spirit and able counsel touched many lives.

A story told of him by intimates shows the measure of Dr. Hall's interest in people as individuals. An undergraduate engineering student at UCLA was in the process of flunking out when Dr. Hall called the student in for a talk. The student in effect said he was too important on campus and no one could flunk him. But flunk he did. Yet, Dr. Hall did not let the case drop. Through third parties, he kept track of the student for two years, and when he had overcome the problems that caused his poor scholarship, Dr. Hall invited the student back to campus. The student responded with honor grades and now is one of the more successful engineers in the West.

At its annual conference in July, the Universities' Council on Water Resources passed a resolution for the establishment of the Warren A. Hall Distinguished Water Resources Young Faculty Medal.

Hall is survived by his wife, Betty; two daughters, Beverly Hall and Marilyn (Mel) Lorentz; a son, Frank; nine grandchildren and five great grandchildren. Any contributions on behalf of the Hall family may be given to the Special Olympics.

WATER FOR PEOPLE

Providing their people with safe drinking water and basic sanitation conditions is one of the biggest challenges facing third-world governments. According to World Bank studies, about 35,000 people in under-developed countries died each day in the early 1980s because of diseases attributed to drinking water and water-related activities. To help provide these elementary needs, The Board of Directors of the American Water Works Association has approved a recommendation to establish **Water for People** - a separate, nonprofit organization permanently sponsored by AWWA. Kurt Keeley, director of AWWA's Information Services, is the lead staff person for the organization. His first objective is to raise money for the project, and the initial goal is $150,000. AWWA has contributed $30,000, former AWWA President Bob Peters pledged about $30,000 previously allocated to a now-defunct entity, and spouses of previous AWWA officers and volunteers raised more than $3,000 in donations at the AWWA annual conference. Keeley hopes to establish a public information program about Water for People. He stressed that its purpose is to provide leadership and to be a catalyst for programs that underdeveloped countries can continue on a long-term basis. For more information contact Keeley at AWWA, 6666 W. Quincy Ave., Denver, CO 80235; (303)794-7711, ext. 4302.

Source: AWWA Mainstream July 1990

BILL MCDONALD, MARGARET SIBLY JOIN BUREC

Bill McDonald, Director of the Colorado Water Conservation Board, has accepted an appointment with the Bureau of Reclamation as Assistant Commissioner for Resources Management. He has been Director of the CWCB, the state's water resources planning and policy agency, since 1979. McDonald has worked in water resources at both the state and federal levels, including service with the U.S. Army Corps of Engineers, the Great Lakes Basin Commission, and the Colorado Department of Natural Resources.

Margaret Sibly will join the Bureau of Reclamation as the Assistant Commissioner for Administration, including personnel management and program and policy development. Her federal career includes service as: Director of the Department of Energy's Office of Policy, Planning and Analysis; Associate Director of Interior's Office of Management Improvement; and recently as Western Representative in Denver for Interior Secretary Lujan.

SENATE PASSES AMENDED REAUTHORIZATION BILL

H.R. 1101, a bill to extend the authorization for the Water Resources Research Act, was adopted by the House of Representatives by a vote of 336 to 74 on June 6, 1989. On August 1, 1990, the U.S. Senate amended and passed H.R. 1101 with a voice vote. The reauthorization maintains the current match of two non-federal dollars for every federal dollar contributed. Before the measure can go to President Bush for signature, the House of Representatives must concur in the amended version of H.R. 1101 adopted by the Senate.

WATER RESEARCH PROPOSALS INVITED BY USGS

The U.S. Geological Survey requests applications for the FY1991 Water Resources Research Program for research on water problems of national concern. Areas of interest are indicated below with the percent of appropriated funds to be

initially assigned to each category, although funding percentages are subject to change following evaluation of the applications.

Social sciences	20 percent
Groundwater flow and transport	15 percent
Water quality	15 percent
Biological sciences	15 percent
Engineering	15 percent
Climate and hydrologic processes	20 percent

USGS Announcement 7719 is available from the Office of Sponsored Research at Colorado State University or the Institute. CWRRI recommends that indirect costs be contributed by home universities for this program. Investigators can consult with Neil Grigg at CWRRI for suggestions about proposal preparation or sources of additional funds. Closing Date: November 20, 1990.

SURVEY SHOWS COLORADO COMMUNITIES USE CONSERVATION MEASURES

Water metering, landscape and sprinkler ordinances, plumbing codes, irrigation management, price restructuring, and leak detection are among the measures used by Colorado municipalities to conserve water. Responding to a survey of water use initiated by the Colorado Legislature's Committee on Water, 16 municipalities provided information about their water conservation programs.

Public education plays a significant role in the efforts to conserve water, including presentations to school groups and community organizations; newspaper, radio, and TV announcements; brochures and films; newsletters; and conferences. Arvada, Aurora, Boulder, Denver, Fort Collins, Greeley, Loveland, Northglenn, Thornton and Wheat Ridge sponsor xeriscape seminars, have xeriscape demonstration gardens, or promote the practice through educational materials.

Computerized irrigation systems - Lakewood's city parks have computer-controlled irrigation systems. An estimated 50 percent of Boulder's parks will be on-line by the end of summer, 1990. The irrigation schedules are adjusted to allow maximum turf quality with minimal water. The Denver Parks and Recreation Department received a grant to install a computerized central control system for 10 parks. Pueblo's Parks Department has a centrally located weather station and the irrigation systems in each of the large parks are tied in to a central computer. The computer measures rainfall, temperature and humidity, and computes an ET rate.

Reuse - In Aurora, water from detention ponds is used to irrigate three city parks, and wells are used to irrigate two city golf courses. Broomfield irrigates approximately ten acres of city lawns with non-potable reuse water. Fort Collins has an agreement with the Platte River Power Authority and Water Supply and Storage to reuse 4,200 acre-feet of sewage effluent at the Rawhide Power Plant in exchange for additional supplies. Greeley uses a small portion of wastewater effluent to landscape its wastewater treatment plant. Lakewood buys nonpotable ditch water to irrigate its parks. Pueblo exchanges return flow from its transmountain water rights back into the Pueblo Reservoir for later diversion into its water treatment plant.

Research - Fort Collins has completed a water rate study, drought study, and water demands options study. Greeley will begin a drought study in 1991.

Legislative Council staff provided the survey results to the Committee on Water, and copies of all survey responses are available in the Legislative Council Office.

LETTER TO THE EDITOR

TO: Neil Grigg, Editor
Colorado Water Resources Research Institute

On Wednesday, July 11, I attended the Interim Water Committee of the State Legislature and heard your testimony about the role of the CWRRI in helping to solve the State's water problems. One aspect of that testimony particularly interested me because it fits in with one of my current interests - the restoration of riparian zones. You mentioned the need for more cooperative efforts between water users, suppliers and environmentalists, and, it seems to me, stream restoration is a possible area where most if not all can agree.

In addition to its considerable importance for wildlife habitat and forage, a healthy riparian zone is generally an indication that stream banks, as their name implies, are storing water. According to recent GAO investigations, riparian habitat loss and stream channel degradation (e.g. incisement) has occurred on the majority, if not overwhelming majority, of low elevation stream miles in western Colorado. Stream channel incisement represents a loss of water storage capacity and beneficial use that is qualitatively certainly significant, but that to my knowledge has not been quantitatively estimated. A notorious example is the channel of Douglas Creek, south of Rangely and north of Douglas Pass. If one considers that 40-80 feet of cutting has taken place and calculates the volume of alluvial soils drained by this cutting and the storage capacity of that alluvial soil, then surely a considerable storage volume loss has occurred. In a state in which water storage is a form of organized religion, I cannot understand why more attention has not been given to this issue. Also, of course, a non-incised channel is much less likely to be a source of sediment that shortens the life of existing downstream storage structures. In short, the Sierra Club might want to endorse a form of dam-building in these channels (or its functional hydraulic equivalent) if restored stream bank function and riparian zone is the result.

It seems to me that a study to estimate the amount of alluvial storage forgone by present riparian conditions might contribute usefully to the debate on how to employ Colorado's surplus Compact water. Is this something that the CWRRI could undertake? Do you think that it might be a useful idea? Any reply that you would be willing to make to this request would be gratefully received.

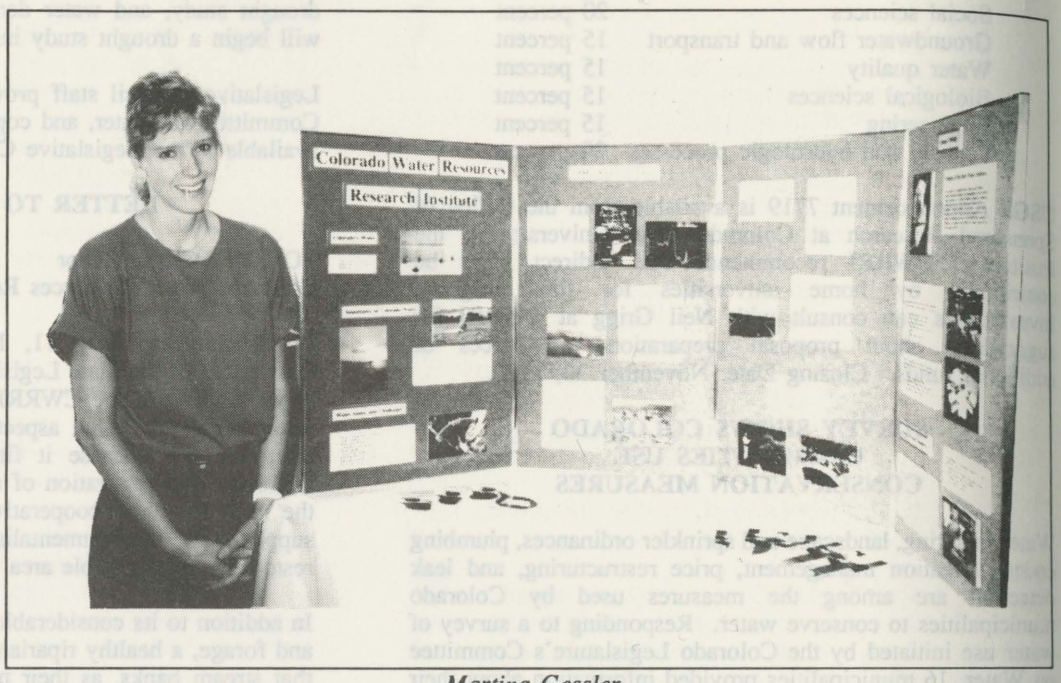
Sincerely,

Kirk Cunningham, Chairman
Water Quality Committee
Sierra Club, Rocky Mountain Chapter

INFORMATION TRANSFER ACTIVITIES INCLUDE NEW PUBLICATIONS AND STATE FAIR EXHIBIT

Highlighting CWRRI's information transfer activities this year are two publications: the first describes CWRRI's **25 Years of Research, Training and Scientific Publications;** and the second explains **Colorado's Water: Climate, Supply and Drought.** Both are available from CWRRI.

Publications Specialists Martina Gessler and Joan Zito, and Joe Pollara, Student Intern, developed the two publications. Martina also designed the CWRRI water resources exhibit for the Colorado State Fair.



Martina Gessler

NEW RESEARCH REPORTS

RIVINT - An Improved Code for Simulating Surface-Groundwater Interactions with MODFLOW, by Judith Schenk and Eileen Poeter. This report describes the features of RIVINT, serves as a users manual for the code, and presents a preliminary simulation of the Denver Basin using RIVINT. RIVINT (short for RIVer INTeraction) was developed for simulation of groundwater systems where river flow can be significantly affected by stresses imposed on the groundwater system. Most available groundwater computer codes simulate river flow by assigning a river stage which remains constant throughout the computer simulation and/or allows for only one or two conditions of seepage between river and aquifer. RIVINT will simulate a variable river stage and will calculate seepage based on the conditions that exist between the river and aquifer during a simulation. It can be used to predict how rivers, or rivers and their alluvium, will be affected by stresses on the groundwater system such as pumping of groundwater. RIVINT interfaces with the USGS three-dimensional groundwater flow code (MODFLOW). The code is currently designed for steady-state or transient simulations if none of the river reaches includes alluvium, and transient simulations if alluvium is simulated with river reaches. CWRRI Completion Report No. 155. Price: $25.00. Magnetic disks included with this document provide the MODFLOW code, a new MODMAIN module, the RIVINT module, and the data files for the preliminary simulation of the Denver Basin.

Potential Pesticide Transport in Colorado Agriculture: A Model Comparison, by Walter L. Niccoli, Jim C. Loftis, Deanna S. Durnford and Gregg Butters. The leaching of agricultural chemicals (fertilizers and pesticides) is increasingly viewed as a major source of groundwater pollution. Leaching causes loss of fertilizers from the root zone and may cost the average farmer a significant portion of his profit. Farmers and regulatory agencies need a tool to help manage these chemicals, and **Opus** and **PRZM,** computer simulation programs, are being considered for use in chemical management decisions. Although they are written for areas where irrigation is not the main source of a crop's water, this study shows that they can be adapted to fit a sprinkler-irrigated farm.

To evaluate these models, chemicals were applied to an experimental facility, and their movements through the soil root zone (45.7 cm. 18 inches) were monitored. Water was applied as rainfall through an overhead sprinkling system. Soil moisture was monitored along with chemical concentrations. Data gathered from monitoring were compared to results obtained from PRZM and Opus, without model calibration, in order to determine the usefulness of such models in a realistic setting. Comparisons showed that Opus predicted changes in soil moisture and chemical concentrations, even though it was not able to predict the measured distributions in the soil profile. PRZM predicted some changes in chemical concentrations, but was unable to assess the measured water-content trend initially. It too was unable to accurately predict measured profiles of moisture content and chemical concentrations. CWRRI Completion Report No. 156. Price: $5.00.

To order CWRRI publications contact the CSU Bulletin Room at (303)491-6198.

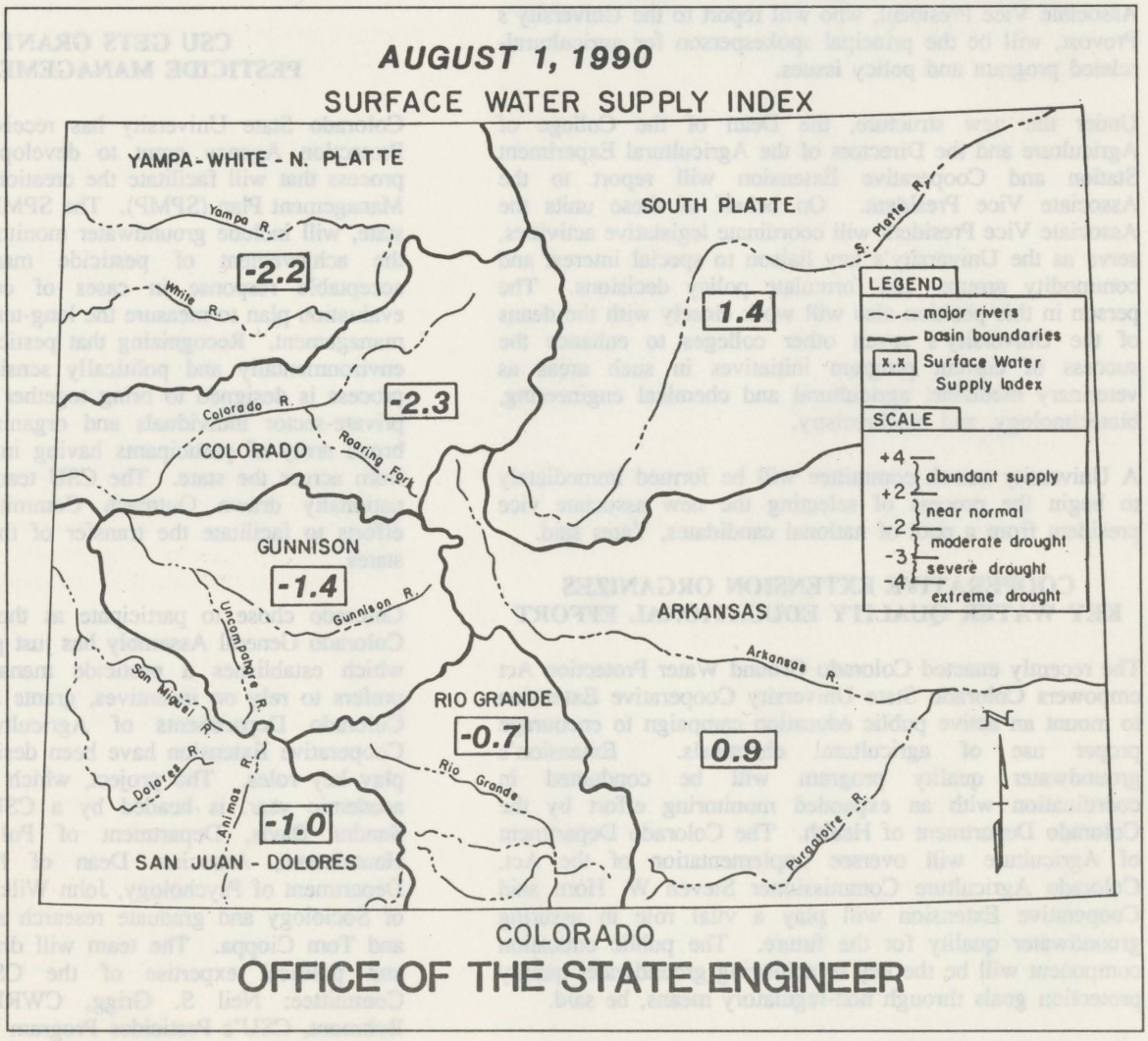
COLORADO WATER SITUATION IMPROVES AS SUMMER PROGRESSES

by Craig Woodring, Graduate Research Assistant

Although the summer started with a hot, dry June, Colorado's water conditions have improved dramatically. Early planning reports in the last two months presented potentially critical scenarios for surface water supplies for the state. However, unusually early and excessive rainfall has improved the state situation.

On July 24, 1990, the Drought Review and Reporting Task Force presented its drought assessment report to Governor Romer. A summary of that report was as follows:

Several index values were in the severe drought range (<-3). The Surface Water Supply Index indicated improvement in all basins with the exception of the San Juan/Dolores which dropped off slightly from the June 1 index value to -2.7. Colorado was extremely fortunate that the monsoon season came a couple of weeks early, putting a cap on what could have been a potentially catastropic situation. Following this early report, July and August continued with above-average precipitation. This was reflected in a summary of an August 15 report from the State Engineer's Office which showed that July's precipitation averaged 156 percent of normal with a high of 187 percent of normal in the Arkansas basin and a low of 140 percent of normal in the Yampa/White basin. June precipitation, by comparison, was only 41 percent of normal. July rains reduced irrigation demands and in some basins provided for storage of excess flows.



Surface water supplies have also improved, though the Western Slope still reflects a slight deficit in water storage. Reservoir storage has been drawn down considerably in the last 12 months, but it remains normal to above normal when compared to historic reservoir storage levels. Storage levels are slightly below normal in the Gunnison and Colorado basins. Relative storage remains highest in the Arkansas basin. The consumption of reservoir carry-over storage this year will impact conditions next year if the 1991 runoff is below normal and as a result storage cannot be replaced. The greatest impacts would be on recreational uses of water. The Surface Water Supply Index (SWSI) developed by the State Engineer's office is used as an indicator of water supply conditions in the state. It is based on reservoir storage, streamflow and precipitation for the summer period (May 1 through Decenber 1). Weight factors are applied to each of the measured hydrologic factors in computing SWSI values.

Statewide Assessment--precipitation during the first part of July improved the water situation statewide. At that time the water-year precipitation was running from 70 percent of the long-term average to 110 percent in some areas. The far western slope still had the greatest precipitation deficit. The Colorado Modified Palmer Index reflected the continuing dry trend on the western slope with most of the western slope running a -4 on the index with some pockets of a -5. The lowest index values were in the Colorado Drainage with the upper Gunnison having the lowest value reported at a -5.97.

COLORADO STATE TO CENTRALIZE AGRICULTURAL AND OUTREACH EFFORTS

President Albert C. Yates announced on August 7 that CSU, to underscore its commitment to support the state's agricultural industry, has realigned its administrative structure to include the position of Associate Vice President for Agricultural Programs and Outreach. Yates said this will allow the University to more effectively respond to the needs of Colorado citizens, "... because our outreach efforts will be centrally planned, developed and coordinated." The Associate Vice President, who will report to the University's Provost, will be the principal spokesperson for agricultural-related program and policy issues.

Under the new structure, the Dean of the College of Agriculture and the Directors of the Agricultural Experiment Station and Cooperative Extension will report to the Associate Vice President. On behalf of these units the Associate Vice President will coordinate legislative activities, serve as the University's key liaison to special interest and commodity groups, and formulate policy decisions. The person in this position also will work closely with the deans of the University's seven other colleges to enhance the success of current program initiatives in such areas as veterinary medicine, agricultural and chemical engineering, biotechnology, and biochemistry.

A University search committee will be formed immediately to begin the process of selecting the new associate vice president from a pool of national candidates, Yates said.

COOPERATIVE EXTENSION ORGANIZES KEY WATER QUALITY EDUCATIONAL EFFORT

The recently enacted Colorado Ground Water Protection Act empowers Colorado State University Cooperative Extension to mount an active public education campaign to encourage proper use of agricultural chemicals. Extension's groundwater quality program will be conducted in coordination with an expanded monitoring effort by the Colorado Department of Health. The Colorado Department of Agriculture will oversee implementation of the Act. Colorado Agriculture Commissioner Steven W. Horn said Cooperative Extension will play a vital role in assuring groundwater quality for the future. The public education component will be the key to achieving groundwater quality protection goals through non-regulatory means, he said.

"Our role is to help the public realize that each individual makes a difference in groundwater quality. With this additional support from the Colorado Legislature through the Water Protection Act, Cooperative Extension will be able to expand awareness throughout the state," said Dennis Lamm. Lamm is Cooperative Extension's Assistant Director for Agriculture and Natural Resources.

A water quality specialist who will lead the statewide education effort will join Cooperative Extension's team later this year, Lamm said. (See Positions Available in this newsletter.) A series of print, video and slide materials will be made available to other concerned agencies through Cooperative Extension's information delivery system. The focus will be to help agricultural chemical users learn to become better managers of the fertilizers and pesticides applied to their crops. Not only will these better management practices prevent waste, they will be a step in the right direction to protect groundwater from dangerous nitrate levels and other inorganic materials. Use of non-chemical alternatives for pest management, including insects and weeds, also will be encouraged.

CSU GETS GRANT FOR PESTICIDE MANAGEMENT STUDY

Colorado State University has received an Environmental Protection Agency grant to develop and apply a model process that will facilitate the creation of a State Pesticides Management Plan (SPMP). The SPMP for Colorado, a pilot state, will include groundwater monitoring that will evaluate the achievement of pesticide management goals, the acceptable response in cases of contamination, and an evaluation plan to measure the long-term success of pesticide management. Recognizing that pesticide management is an environmentally and politically sensitive issue, the model process is designed to bring together a team of public and private-sector individuals and organizations representing a broad array of participants having interests in groundwater from across the state. The CSU team, with advice from a nationally drawn Outreach Committee, will recommend efforts to facilitate the transfer of the model to additional states.

Colorado chose to participate as the pilot state since the Colorado General Assembly has just passed Senate Bill 126 which establishes a pesticide management program that prefers to rely on incentives, grants and cooperation. The Colorado Departments of Agriculture and Health and Cooperative Extension have been designated by the state to play key roles. The project, which begins with the 1990 academic year, is headed by a CSU team comprised of Sandra Davis, Department of Political Science, Jacob Hautaluoma, Associate Dean of Natural Sciences and Department of Psychology, John Wilkens-Wells, Department of Sociology and graduate research assistants John Redifer and Tom Cioppa. The team will draw upon the technical and political expertise of the CSU Project Advisory Committee: Neil S. Grigg, CWRRI Director; Bert L Bohmont, CSU's Pesticides Program Coordinator; and John A. Straayer, Professor of Political Science.

STEVEN ABT APPOINTED CSU HYDRAULICS LAB DIRECTOR

Steven R. Abt, Professor of Civil Engineering, was recently appointed Director of the Colorado State University Hydraulics Laboratory. Dr. Abt is responsible for operations, scheduling and management of research and testing activities in the Hydraulics Laboratory, Hydromachinery Laboratory, and outdoor testing facilities.

Dr. Abt joined the Colorado State University staff in 1977 after working as a consulting engineer in Denver. His research has included river mechanics, hydraulic structures, riprap design, flow measurement, and physical modeling. In addition to his teaching and research duties, Dr. Abt serves as the Civil Engineering Associate Department Head for Research and as Acting Hydraulics Program Leader.

The Hydraulics Laboratory was constructed in 1962-63 under the direction of A. R. Chamberlain and M. A. Albertson. The laboratory highlights a dozen open channel flumes capable of recirculating flows of over 125 cfs. The Hydromachinery Laboratory features unique testing capabilities with 230 feet of head from nearby Horsetooth reservoir with flow capacities of nearly 100 cfs. A new turbine research facility was recently installed allowing state-of-the-art investigations in cavitation and turbine operations analysis.

Technical information about or tour arrangements for the Hydraulics Laboratory may be obtained by contacting Dr. Abt at (303)491-8203.

CALIFORNIA CENTER WILL COORDINATE GLOBAL CHANGE RESEARCH

University of California Regents have approved creation of a western center, the National Institute for Global Environmental Change, that will look at the effect global warming might have on agriculture and the water supply in the West. The Institute, operating from a central office at the University of California at Davis, will start out with a $6 million budget from the Department of Energy. The Davis office will coordinate research at regional centers that are to be set up at Harvard University, Indiana University, Tulane University, and the University of California system.

Source: Chronicle of Higher Education 8/6/90

HOUSE APPROVES $2 MILLION FOR CSU SEED LAB

On July 13 the House Appropriations Committee approved $2 million to expand the National Seed Storage Laboratory, only half the funds requested. The lab, which houses more than 250,000 samples of germplasm for agricultural research, is running out of space. Steve Eberhart, Director of the Seed Lab, said the space situation is critical, and without lab expansion they may have to stop receiving seeds next year. Representative Hank Brown said he will continue to press for additional funding.

Source: Coloradoan 7/14/90

MESA STATE RECEIVES GRANT FOR ENVIRONMENTAL RESTORATION PROGRAM

Acting Mesa State President Ray Kieft announced on July 27 that the college will start a two-year degree program this fall in environmental restoration engineering technology. The program will be funded with a $50,000 grant from the U.S. Department of Energy, $20,000 or more from the state, and $825,000 (in the form of computers) from AT&T. There will be 31 state-of-the-art personal computers, three mini-computers, six high-speed printers and software, Kieft said. Governor Romer said the new program at Mesa State "can become a national model." AT&T Representative Mary Ann Littler said Mesa State was one of 62 colleges nationwide asked to submit grant proposals and received one of the highest funding levels of any of the 54 grants issued.

Source: Grand Junction Daily Sentinel 7/27/90

CSU CENTER HELPS PREVENT POLLUTION

The **Waste Minimization Assessment Center** at Colorado State wants to help reduce industrial pollution and its director Harry Edwards, Professor of Mechanical Engineering, says pollution prevention pays. Since 1988 the Center has helped 20 small and medium-sized Colorado manufacturers modify production lines to reduce emissions of toxic and hazardous chemicals. An assessment team visits a plant three times, calculating its annual use of toxic chemicals and investigating how they are used. The team recently audited a firm that makes cabinets and metal components used to arrange clusters of electronic instruments. Recommended changes ranged from the recycling of water used to cool metal drills to using water-based paints and powder-based coatings. The changes would cost the firm $32,000 a year but save $52,000 in production costs a year. A basic three-day audit costs $7,000, and the Center is limited to conducting one audit per month, or 12 per year. The results are reviewed by a research management firm in Philadelphia and the Environmental Protection Agency. The Center has an annual budget of $84,000, provided by EPA, with eight employees including students.

Source: Rocky Mountain News Science and Environment Series 8/6/90

Henry P. Caulfield, Jr. received a certificate of appreciation from the Board of Directors of the Universities Council on Water Resources on August 2 at the Council's annual meeting in West Point, New York. The certificate acknowledged Caulfield's vision and leadership in the advancement of water resources education and research, and designated him as a "Friend of UCOWR." Caulfield is a Professor Emeritus in Political Science at CSU and former Director of the Water Resources Council.

The ***Natural Hazards Observer*** has announced two research grant awards to University of Colorado and Colorado State faculty. With a grant from the Bureau of Reclamation, **Gary McClelland** of CU will develop effective decision criteria for early warning systems in case of dam failures or large releases of water. USBR is proceeding with the design and installation of early warning systems for a significant number of dams in order to provide timely downstream warning and evacuation procedures. Most of the systems will also provide warnings in case of very large storms. McClelland is a faculty member of the Department of Psychology. **Hal Cochrane**, Department of Economics at Colorado State, will study the economic impacts of the San Francisco earthquake and Hurricane Hugo in Charleston, South Carolina. The grant was awarded by the National Science Foundation.

Robert A. Young, Professor of Agricultural and Resource Economics at CSU, will serve on a newly established

Committee on Planning and Remediation for Irrigation-Induced Water Quality Problems. Members will provide advice to the National Irrigation Water Quality Program (NIWQP), which is pursuing a series of studies around the West to identify, document, and mitigate sites where trace-element contamination is adversely affecting the biota and the environment. The Water Science and Technology Board of the National Research Council established the committee at the request of the Department of the Interior.

Source: WSTB Newsletter Vol. 7 No. 3

COLORADO WATER RESEARCH

A summary of water research awards and projects recently initiated is given below for those who would like to contact the investigators to receive information.

COLORADO STATE UNIVERSITY, FORT COLLINS, CO 80523

Development of a Recreation and Tourism Assessment System for Rocky Mountain Arsenal, Michael J. Manfredo, Recreation Resources

Biosphere - Atmosphere Interactions: A Study of the Energy, Water and Carbon Cycles, David A. Randall, Atmospheric Science

Water Control and Measurement in Irrigation Systems, Ramchand Oad, Agricultural and Chemical Engineering

Carbon Balance in Global Grasslands, David Schimel, Natural Resource Ecology Lab (NREL)

Deterring Heron Predation on Fish at Fish Hatcheries, William F. Andelt, Fishery and Wildlife Biology

Use of Toughness Data in Specification, Design, and Performance Evaluation of Fiber Cement, Marvin Criswell, Civil Engineering

Long-Term Ecological Research Program - Shortgrass Steppe, William K. Lauenroth, (NREL)

Issues and Concepts in Pastoral Ecology, James Ellis, NREL

Water Resources and Environmental Engineering, Evan Vlachos, Sociology

Radioecological and Ecotoxicological Investigations at Rocky Flats, Floyd W. Whicker, Radiology-Radiation Biology

Public Preference for Non-Consumptive Wildlife Recreation and Tourism in the Denver Area, Michael Manfredo, Recreation Resources

Advanced NMR Approaches in the Characterization of Coal, Gary Maciel, Chemistry

A Quantitative Evaluation of Stream Habitat Improvement Structures Using the PHABSIM, Kurt Fausch, Fishery & Wildlife Biology

Design of a Remote Dropnet Release Mechanism, Bryan Willson, Mechanical Engineering

Drought Monitoring, Thomas McKee, Atmospheric Science

Management Modeling of Aquifer Cleanup Systems, James W. Warner, Civil Engineering

Computer Modeling, Software Development and Documentation for Watershed Hydrology, Jose D. Salas, Civil Engineering

Hydrologic Cloud Studies, David A. Randall, Atmospheric Science

Improved Rural Bridge Technologies, Richard M. Gutkowski, Civil Engineering

Population Modeling, Gary C. White, Fishery and Wildlife Biology

Population Estimation, Fishery and Wildlife Biology

UNIVERSITY OF COLORADO, BOULDER, COLORADO

Investigation of the Impact of Forest Fires on the Chemistry and Water Quality of Groundwater in Yellowstone National Park, Donald Runnells, Geological Sciences

AMS 14c Dating of Arctic Lake Sediments, Gifford Miller, Institute of Arctic and Alpine Research (IAAR)

Bacterial Transformations of Selenium Pollutants, R. Ray Fall, Cooperative Institute for Research in Environmental Sciences (CIRES)

International River Basin Management in a Changing Climate: A Sensitivity Analysis of Selected Rivers, William Riebsame, Institute of Behavioral Science

Development and Implementation of ADSS (Advanced Decision Support Systems) for Management of Systems in the Lower Colorado Region, Henry Horsey

Development and Construction of Automated Slurry Consolidometer, Dobroslav Znidarcic, Civil Engineering

Comparative Lithological Mapping Using Multipolarization, Multifrequency Imaging Radar and Multispectral Official Remote Sensing, Alexander Goetz, CIRES

Graduate Training Program in Conservation and Sustainable Development, David W. Crumpacker, Environmental, Population and Organismic Biology

U.S.-Australia Joint Workshop on Water Allocation and Transfer Systems in USA and Australia at the Centre for Water Policy Research, Univ. of New England, Armidale, Charles Howe, Institute of Behavioral Science (ISBS)

WE NEED YOUR HELP ON THIS SURVEY OF WATER-BASED RECREATION!

The Colorado Water Resources Research Institute and Colorado State University are conducting this important survey concerning water-based recreation. You have been selected as one of the key people to help us identify water issues and problems as they relate to water based-recreation and tourism in Colorado. When we speak of water-based recreation, we are referring to all types of recreational activities associated with water such as fishing, boating, rafting, water skiing, swimming, waterfowl hunting, camping next to water, sightseeing around water, hiking by water, etc. These recreational activities may take place on or next to rivers, streams, canals, reservoirs, lakes, ponds, etc. Please keep this in mind as you complete this survey.

We are counting upon your response to these important survey questions. Please take a few minutes to complete this survey. When you have finished, please tear out the survey and then fold, staple and mail with the return address facing out.

Thank you for your help!

Dr. Neil Grigg
Director
Colorado Water
Resources Research
Institute

Dr. Robert Aukerman
Professor
Recreation Resources &
Landscape Architecture
Colorado State University

K-Lynn Cameron
Park Planner
Larimer County
(303) 679-4570

SURVEY OF WATER ISSUES RELATED TO RECREATION AND TOURISM IN COLORADO

1. How important is water-based recreation to the quality of life in your community? Circle the appropriate response below.

Not at all Important	Slightly Important	Somewhat Important	Moderately Important	Extremely Important

2. How important is water-based recreation and tourism to the economy of your community? Circle the appropriate response below.

Not at all Important	Slightly Important	Somewhat Important	Moderately Important	Extremely

3. List and prioritize, in the space below, water issues, concerns and/or problems that you believe are important as they relate to water-based recreation and tourism in Colorado. Please provide a short explanation as needed for clarity.

4. Rank the following economic sectors in order of importance to your community (1=highest and 12=lowest).

Agriculture and forestry	_____	Electric, gas, and sanitary services	_____
Mining	_____	Wholesale trade	_____
Construction	_____	Retail trade	_____
Manufacturing	_____	Finance, insurance, and real estate	_____
Transportation	_____	Government	_____
Communication	_____		
Recreation, tourism and related services	_____		

5. What percent of your local economy comes from water-based recreation and tourism? Please estimate. _____%

6. There are many uses of water in Colorado. Rank in order of importance to you, the six uses listed below (1=highest and 6=lowest).

Agricultural	_____	Municipal	_____
Flood Control	_____	Power Production	_____
Industrial	_____	Recreation	_____

7. Based on your response to #6, is recreation presently getting the attention you believe it deserves as a use of water?

Yes _____ No _____ If no, why not?_____

_____

_____

8. Do you believe that the need for water-based recreation opportunities is adequately being met in your community? Yes _____ No _____ If no, then what opportunities are not being met? Please list below.

_____ _____

_____ _____

_____ _____

9. Listed below are water issues related to recreation and tourism in Colorado. Please indicate how important you believe each of these are to Colorado.

Water Issues	not at all important	slightly important	somewhat important	moderately important	extremely important	No opinion
	Circle one response per issue					
Water levels in reservoirs	0	1	2	3	4	N
Water levels in rivers	0	1	2	3	4	N
Reservoir water releases	0	1	2	3	4	N
Public access to water	0	1	2	3	4	N
Crowding/overuse of water	0	1	2	3	4	N
Conflicting uses on water	0	1	2	3	4	N
Quality of recreational facilities	0	1	2	3	4	N
Quantity of recreational facilities	0	1	2	3	4	N
Quality of recreational experiences	0	1	2	3	4	N
Quantity of recreational experiences	0	1	2	3	4	N
Damming rivers for storage	0	1	2	3	4	N
Water storage projects	0	1	2	3	4	N
Diversion of water to other regions	0	1	2	3	4	N
Funding for water-based recreation	0	1	2	3	4	N
User fees and charges	0	1	2	3	4	N
Marketing & publicity of water-based recreation opportunities	0	1	2	3	4	N
Water safety	0	1	2	3	4	N
Liability/Insurance	0	1	2	3	4	N
Private vs. public use of water	0	1	2	3	4	N
Supply of water recreation areas	0	1	2	3	4	N
Competition for the use of water	0	1	2	3	4	N
Designation of water for recreation, such as wild and scenic rivers	0	1	2	3	4	N
Water Quality	0	1	2	3	4	N
Public Health	0	1	2	3	4	N
Water rights/law	0	1	2	3	4	N
Purchase/lease of water	0	1	2	3	4	N
Location of water recreation areas close to home	0	1	2	3	4	N
Trespass by recreationists onto private land	0	1	2	3	4	N
Aesthetics/visual quality	0	1	2	3	4	N
Other _____	0	1	2	3	4	N
_____	0	1	2	3	4	N
_____	0	1	2	3	4	N

10. What Colorado water issues or problems do you believe need the most research or study? Please list below.

_____

_____

Demographics

Do you live in a town or city? _____ Name _____

Do you live outside city or town limits? _____

County you reside in _____

Occupation _____

Board, Commission, Business, Agency or other Organization that you are representing: _____

_____

Name (optional) _____

Telephone (optional) _____

RETURN TO:

Department of Recreation Resources
and Landscape Architecture
Forestry Building
Attn: K-Lynn Cameron

A Clearinghouse on Natural Hazards Research and Applications, William Riebsame, Institute of Behavioral Science
Joint US-Italy-Yugoslavia Research on Evaluation and Retrofit of Masonry-Infilled Reinforced Concrete Frames, P.S. Benson Shing, Civil Engineering
Research in Geosciences Policy (Law, Geography, Economics), Radford Byerly, Center for Space and Geosciences Policy
Global Surface-Based Cloud Observations for ISCCP, Stephen Warren, CIRES
Estimating Ecosystem Biogeochemistry Through Hyperspectral Analysis, Carol Wessman, CIRES
Sediment Flux Along a Fiord-Shelf Transect, East Greenland, John Andrews, Institute of Arctic and Alpine Research
Planning Bridge Deck Repair Based on Chloride Content, Bruce Suprenant, Civil Engineering
Transport and Fate of Multiphase Subsurface Contamination, Tissa Illangasekare, Civil Engineering
Using Multi-Sensor Data to Model Factors Limiting Carbon Balance in Global Grasslands, Carol Wessman, CIRES
Continuous Monitoring of the Global Atmospheric-Electric Circuit, Ben Balsley, CIRES
Composition of Bromine Aerosols Related to Ozone Destruction in the Arctic, Patrick J. Sheridan
Biodegradation of Organic Compounds in Water, Joann Silverstein, Civil Engineering
Multiphase Flow in Soils: Modeling and Experimental Study, Dobroslav Znidarcic, Civil Engineering
Distribution and Recovery of Refinery Waste Products in Groundwater Aquifer: Experimental Study and Model Evaluation, Tissa Illangasekare, Civil Engineering
Economics and Psychology Policy Research for Environmental Management, William Schulze Center for Economic Analysis
Chemically Assisted In-Situ Recovery of Oil Shale, W. Fred Ramirez, Chemical Engineering
Thermohaline Circulations and Global Climate Change, Howard Hanson, CIRES
Advanced Decision Support for Water and Environmental Systems, Kenneth Strzepek, Civil Engineering

FROM COOPERATIVE EXTENSION

by Jim C. Loftis, Associate CWRRI Director and
Paul D. Ayers, Israel Broner and Lloyd Walker
Extension Agricultural Engineers

County Water Quality Projects Funded--The long-awaited water quality program support funds from ES-USDA have finally arrived. Several small projects at the county level have been funded based on short proposals solicited by the Extension Water Quality Task Force. Here is a brief rundown on this year's projects.

1. Dan Einarsen, on behalf of the 4-H Natural Resources Education Task Force, proposed three statewide adult training workshops on water quality, conservation awareness and natural resources activities. Participants will be youth agency educators. Amount: $800.

2. Bob Clark (Pueblo County) proposed a nitrate management project involving a comparison of crop yields under traditional and recommended fertilizer rates. Amount: $800.

3. Al Meier on behalf of Adams, Jefferson, Larimer, Logan, Morgan, Park, Sedgwick, and Weld counties proposed a study of water quality on the Platte and Poudre rivers by 4-H youth. Ten field testing kits for nitrate, pH and total dissolved solids have been purchased from Hach at a cost of $150 each. Lloyd Walker recently attended a two-day training course on the subject of nitrates at Hach in Loveland. Lloyd will be able to assist Agents in the use of these kits as a part of 4-H and other water quality Programming.

4. Ronny Bailey (Las Animas County) proposed a demonstration of factors involved in effective irrigation water management for corn, alfalfa and small grains. Moisture meters and gypsum blocks will be purchased at a cost of $560.

5. Bonnie Ennis (Adams County) is working with a commercial vegetable grower to reduce nitrate leaching via irrigation water and fertilizer management. A budget of $400 is to assist with the cost of water and soil analysis and irrigation evaluations.

6. Gary Lancaster (Sedgwick County) proposed an educational program dealing with nitrate in ground water. A budget of $500 is to be used primarily for preparing educational materials.

The Extension Water Quality Task Force has also earmarked $1000 for each of the counties designated by ASCE for Integrated Crop Management cost sharing. The ICM program is to achieve participation from up to 20 farmers per county in implementing a higher level of fertilizer and pest management with a target of 20 percent reduction in agricultural chemical use. The counties now in the program are Mesa, El Paso, Prowers, Saquache, and Boulder.

The Extension funding is designed to facilitate cooperation between Extension and Soil Conservation Service in implementing the program and extending its results to other farmers through educational programs. At this time, funds have been released to the Tri River Area staff for soil analysis and fertilizer recommendations, a corn rootworm study, irrigation management, and herbicide management. The Tri River staff did an excellent job of preparing their proposal, using an interagency planning committee.

The other major item from this year's program support funds will be a water quality notebook for all counties, containing the best publications from Colorado and around the country on topics related to agricultural impacts on water quality. Lloyd is taking the lead in this effort, and more news will be forthcoming.

COLORADO GROUNDWATER MANAGEMENT ISSUES

by Jeris Danielson, State Engineer

Transcript of Talk at
Groundwater Engineering and Management Conference, Plenary Session
February 28, 1990

I would like to talk to you a bit about groundwater management in Colorado and particularly what I see as some of the future issues.

There are many ways to break groundwater down. Our legislature has done it in a curious way, in that one of my duties is the permitting and allowance of appropriation of groundwater in the state, and we don't do things easy here in Colorado. We have five different kinds of groundwater from the standpoint of appropriation. We have tributary groundwater and a whole set of laws that define how you deal with tributary groundwater. We have nontributary groundwater, and so far that is pretty understandable, but then we have not nontributary groundwater. If I recall my third-grade education out in eastern Colorado, two negatives cancel each other; so, not nontributary ought to be tributary, right? Well it isn't, at least not in the General Assembly. Then we have exempt groundwater and we have designated groundwater, and I probably left a couple out.

But I'm not going to talk to you in those confusing terms. I'd like to speak to you more in terms of the source itself and some of the management problems that we have. If I had to define the number one water management issue, particularly the groundwater management issue in the coming decade, that issue is quality. Take a look at the program that you will sit through for the next two days. Forty percent of the topics in that program deal with quality. It was unheard of 10 years ago in this state to spend that kind of time and that kind of interest on a water quality concern. Remember that we have a hundred years of prior appropriation doctrine in this state, and the law that constrains the Colorado Water Quality Control Commission is this: the Water Quality Control Commission can do whatever it wants to do: just don't impinge on water quantity. Water quantity is paramount, the right to appropriate is paramount and overrides any quality consideration, and that is a statement from the legislature. Does it make sense in today's real world in Colorado? I don't know. Probably not. But that is the framework that we find ourselves having to operate in, so we've got to deal with the question of the decade: quality, in that kind of legislative framework.

Why do I say that water quality is the issue of the decade? Several reasons. There had been no national focus on groundwater until about 1985. Let's face it, in the West we like to think about states rights. If we could just get rid of everything east of Ogallala, Nebraska our life would be a lot simpler, but that's not the real world. We are a part of a federation of states, whether we like it or not. So Congress and the federal government are deeply involved in water quality, and I might add that part of the reason is that we, as states, have not done a good job in dealing with the issue. There are 23 bills sitting in Congress right now dealing with water quality - pretty scary for a western state, a sovereign western state.

The general population today is tuned in to the environment. The Denver Post did a poll four months ago and asked 1500 citizens, "What is the number one issue in the State of Colorado?" The number one issue was jobs, of course. What was number two? Nineteen percent said environment, quality of life. Quality is going to be the issue of the '90s.

We must be very careful that when solving the water quality problem we don't eliminate the very people that we are trying to help. If we go out and solve the quality problem in the eastern high plains, in the Ogallala Aquifer, and in doing so we put all those agricultural people out of business, we really haven't solved the problem. We may have pristine waters, but if there is nobody around to use them you get into the old philosophical argument, "If a tree falls in the forest and there's nobody around, is there anyone to hear it?" If you clean up all the water, but there is no one there to use it, is that a good objective? Some might argue yes, but I don't think it is from an economic standpoint for the state.

I'm going to get off the quality kick to some extent because some of the issues still are quantity issues, management issues, how we deal with the resource in terms of its use outside of the issue of quality.

Tributary groundwater. We use tributary groundwater in this state as a supplemental water source for over 2 million acres of irrigated agriculture. About eighty percent of all the towns and cities incorporated in this state rely solely on tributary groundwater for their municipal water supply. Ninety-nine percent of all rural use is from these sources of groundwater. A lot of folks out there depend on this water simply to sustain life. The issues with this kind of water are purely quality issues. We have refined our laws to the point that we know how to manage them. We know how to describe them in terms of the physics. We know how to administer them. The issue with these kinds of water is purely quality. What do we do? We don't have similar refined laws for water quality. Do we know that if we regulate the use of pesticides by agriculture that we're going to clean up this resource? I don't think we can, because if you do that, you put every farmer out of business in the South Platte and the Arkansas Basins. So we have to really look at what our quality management objective is in those kinds of situations.

The Ogallala Aquifer furnishes about 30 to 40 percent of the food and fiber grown in this nation: you might say it's an important resource. What are we doing with it? Well, we have two issues with respect to the Ogallala. One is a management issue in terms of quantity. Texas had no management plan at all, and simply said if you own the land, pump the water. What happened? Have you been to Lubbock or Amarillo lately? It's pretty grim. They're starting to come back a little bit, but they basically have used that resource completely and now are looking at alternative forms of agriculture and other things to do with

their economy. Colorado in 1965 took the position that we'll deplete the resource at the rate of 40 percent in 25 years. What drove that decision? It was driven primarily by the lending institutions. A farmer generally could pay off a center pivot sprinkler and a well in 25 years, and that's what drove the management decision. The 40 percent was kind of incidental. The reasoning was, "Well, we don't want to use it all up in 25 years, so let's pick 40 percent." That's perhaps a bit of an overstatement, but we need to really look at that decision because we're at the end of the 25 years. What about the next 25 years? What happens when 600,000 acres of irrigated land go out of production in eastern Colorado? What happens to Burlington, Yuma or Wray?

An issue of equal importance in the Ogallala is the issue of quality, and I'll speak to that at little bit later.

Nontributary aquifers. If you add up all of the groundwater resources in the State of Colorado that meet the nontributary standard, you find that the Denver Aquifer has about 95 percent of all of our groundwater. We only tap about one or two percent of it at this point, which is kind of good. We're ahead of the power curve in terms of making decisions about what to do with that resource. What kind of guidance do we have from the General Assembly? The General Assembly has said if you own the surface land, you have the rights to the nontributary groundwater, a major departure in terms of water law. And they said make it last a hundred years. Now, what's the scientific basis for that? The scientific basis was that even though legislators believe in their own immortality, none of them felt they would live more than a hundred years. And basically, let's let someone else deal with the problem. Science will save us. That's the management objective we use on the water that's right now used in the metropolitan area by 250,000 residents; make it last a hundred years.

Well, for any of you who understand basic groundwater hydraulics, that doesn't translate into "I drill a well and I get one percent a year for one hundred years." It means I drill a well and ten years from now I drill four wells and twenty years from now I drill eight more wells to maintain that level of production. And what are the economics of that? Do we really need to look at that issue? We have given no consideration in this state to the quality protection of those aquifers. None. We're looking at and playing with, in the case of the Willows Water District here, a small recharge program. But we're injecting treated water out of the Denver system into the Denver Basin Aquifer. Nobody knows what the water chemistry is when you inject even treated water 1500 feet into the Arapahoe formation. We need to be thinking about those issues.

Outside of the Lowry Landfill, the Rocky Mountain Arsenal and Rocky Flats, we probably don't have any major quality problems in the state that exceed the quality problem on the Front Range. We have about 100,000 people in the mountains on the Front Range; in Evergreen and Estes Park and up the Boulder Canyon. Most of them don't understand that they are drinking well water that probably is some of the most vile in the state. In many instances you find people hauling water, and they've done this for years. Those aquifers are all secondary porosity aquifers, with cracks and fractures. They are very susceptible to pollution, and extremely susceptible to drought. We've had four excellent years on the Front Range in terms of precipitation. This year doesn't look so good. There will be homes, I guarantee you, that by August will be out of any kind of water supply. What are we doing about those aquifers? Nothing. We need to look at those 100,000 people with major investments trying to survive on that resource.

The last source of water that I would mention to you is the deep artesian aquifer in the San Luis Valley. The USGS has estimated that as much as two billion acre-feet of water is in storage in that aquifer. That may be an overstatement, but let's say that it is only one billion. That exceeds the virgin yield of our surface rivers and streams in this state by a factor of probably a thousand. We are talking about a major resource. There's not a quality problem here, but generally speaking a management problem. The rivers in the San Luis Valley and the shallow aquifers ride on top of that system. What we say under our present appropriation law is that we're going to lock that resource in perpetuity, out of any kind of production so that we can continue to enjoy a surface stream that rides along on top of that system. That's a management problem that I think we really need to look at. Surely we're smart enough to figure out how to preserve the whole water rights system in that valley and perhaps gain some beneficial use out of that main aquifer.

Let me summarize. My feeling is that at least in Colorado there is time to make rational decisions. We need to begin immediately collecting baseline data. We know all there is to know, I think, about the physics of groundwater in this state. You might argue that the San Luis Valley is a rather complex hydrologic system, but generally we can describe it. The physics of groundwater is not a problem, but the baseline quality data is. It is not exciting, fun, flashy. You cannot take a legislator out and have a ribbon-cutting ceremony when you begin to sample groundwater. We need to know if there a problem or not before we answer the question: "How much help do you want from the federal and state governments to help you solve your problem?" We don't even know if there is a problem yet in many parts of the state. We have to get local government and local entities and local people involved. An interstate stream is very different from an aquifer. If we pollute the headwaters of the Colorado River, just 80 miles to the west of here, folks in Los Angeles will perceive that pollution within a matter of weeks. If we pollute the Ogallala Aquifer out around Kit Carson, the impacts of the pollution are not carried away. They remain right there. It's the very people who use that aquifer-- trying to live off of it, trying to drink it--it's their kids who have to be involved in the solution.

Three years ago the Assembly enacted an agriculture chemigation act designed to protect all groundwater from pollution as a result of agricultural chemigation practices. What was the genesis of that law? It came from four little groundwater management districts out in eastern Colorado, who sit out there and drink that water and put it on their crops and who understand the impact on the future of their kids and their grandchildren if they don't protect that resource. That's the genesis of that act. Who was the legislator who carried it in the House? It wasn't an environmentalist from Boulder. It wasn't a school teacher from Arapahoe County. It was a potato farmer from

Alamosa who makes his living raising potatoes and applying chemicals to the ground through his center pivot. When you get that kind of involvement you make a major step toward solving the water quality problems.

Can we solve the water quality problem? Absolutely. Can we do it as a state? No. Can the Feds do it for us? No. It takes a partnership. Certainly the Feds will be a major actor, but you're not going to get money without federal regulation. So we've got to be very careful in terms of how we structure the federal involvement. There are tremendous technical abilities at the federal level, and research can do many, many things to help us solve the problem. But the control has got to be with that farmer out at Kit Carson who's pumping water up and having his kids drink it. We have come a tremendous way. It was only 20 years ago that the vast majority of people in this state believed in the snowball theory of groundwater. Now, you may ask, "What is that?" Some of you here still believe that. It's the theory that the center of the Earth really is a giant snowball and as it melts it creates groundwater. We've come a long way. We can model the earth now, and most people don't subscribe to that theory. The major challenge is how to get the politics, the public impression and reaction up to speed with our technical knowledge.

WATER NEWS DIGEST

NATIONAL HISTORIC CORRIDOR DESIGNATION SOUGHT FOR CACHE LA POUDRE

Representative Hank Brown announced at a July 5 news conference that he has introduced a bill to designate an urban stretch of the Cache la Poudre River running through Fort Collins as a National Historic Corridor. "This gives us the opportunity to acquire open space along the Poudre's flood plain," said Brown. "That not only provides green space and recreational opportunities, it is the cheapest form of flood control," he said. Brown was joined at the announcement by local officials from Fort Collins, Larimer County, Colorado State University and others who worked on the plan.

Professor Howard Alden of Colorado State said the proposal is a creative approach to preserving national heritage and the role water played in developing the West. Brown's bill would establish a 17-member commission to manage the corridor and handle gifts and exchanges of property for the corridor. Currently about 90 percent of the riverfront inside the Fort Collins city limits is publicly owned. The designation would be the first in Colorado and only the third in the nation.

Sources: Denver Post 7/6/90, 7/7/90

DECISION EXPECTED SOON ON PROPOSED ARKANSAS RIVER DESIGNATION

The U.S. Bureau of Land Management says it hopes to have a decision by the end of this year on whether to propose designation of a 120-mile stretch of the Arkansas River as wild and scenic. As part of the Royal Gorge Resource Area Study, BLM will look at the stretch of river between Leadville and Canon City to see if it can be included in the wild and scenic river system.

The designation would limit water development plans in Colorado Springs. A study commissioned by the city and completed last year identified a site just upstream from Buena Vista as one of five preferred alternatives for building a dam to store its Arkansas River water supply. Jim Phillips, Colorado Springs Director of Utilities, said the wild and scenic designation could also affect how much water can be taken from the river even if no dam is built.

The Arkansas Valley river-rafting industry wants the dam blocked. Colorado Environmental Coalition spokesman Todd Robertson said he has no recommendation yet.

Source: Associated Press 8/5/90

GRAND JUNCTION BUYS RIVERFRONT LAND

The Grand Junction City Council has agreed to buy a key 50-acre parcel of land at the confluence of the Colorado and Gunnison Rivers for the city's Colorado Riverfront Project, its third land acquisition since November, 1988. City officials eventually hope to make back all the money invested with leases and sales after dedicating a 100-foot strip of land to the project, which will develop a greenbelt along the Colorado River from Palisade to Fruita.

The 50 acres of land is currently used as an automobile salvage yard, and an environmental audit revealed lead contamination on the property. City officials estimated that they might have to spend as much as $750,000 to clean up the lead but now the cost is estimated at $50,000 at the most, because of an agreement reached between the U.S. Department of Energy and the Colorado Department of Health. Health officials think the lead can be left in place and DOE has agreed to cover the costs of remedial action on lead deposits mixed with uranium mill tailings.

Jim Robb, co-chairman of the Grand Junction/Mesa County River Commission, said he is pleased with overall progress on the project and with the involvement of the City of Grand Junction. City Councilman R. T. Mantlo said the key now is to develop a master plan for the riverfront project.

Source: Grand Junction Daily Sentinel 8/5/90

PINYON CANYON LAND TRANSFER SOUGHT

The Senate Armed Services has approved a Tim Wirth/Hank Brown plan to transfer about 16,700 acres in Pinyon Canyon from the U.S. Army to the Forest Service. This would allow public access to the Purgatoire River Canyon, one of the most magnificent in the West. In the mid-70s the canyon, located northeast of Trinidad, was on the state's master plan for development as a state park. At that time the Army

promised to eventually open the canyon to public use if the state withdrew its objections to the Army's land acquisition in the area.

Source: Denver Post 7/20/90

$8 MILLION ALLOCATED FOR DEMONSTRATION OIL SHALE PROJECT

An Interior appropriations subcommittee has allocated $8 million for a proposed demonstration oil shale project to be built in northwestern Colorado, between Meeker and Rifle. Representative Ben Nighthorse Campbell made the announcement, saying that the test facility will be constructed on a 50-50 cost share basis with industry. Campbell said one of the reasons the idea has support in Congress is because Occidental Oil corporation will pay half the cost and will manage the facility once it is built. The project can proceed if the appropriation is maintained in the Senate.

Source: Pueblo Chieftain 7/28/90

FEDS WILL DETERMINE FLOW RATES

The Supreme Court has ruled, in a 9-0 vote, that the Federal Power Act gives the Federal Energy Regulatory Commission (FERC) exclusive jurisdiction to determine minimum water flow rates. California, supported by 43 other states, had argued that the states and not the federal government control water flows at federally licensed dams. Since the decision, Congressman Larry E. Craig of Idaho has introduced legislation that would amend section 27 of the Federal Power Act and specifically prohibit FERC from interfering with any state law or regulation regarding water or water rights.

The Western States Water Council, at its quarterly meeting in Bismarck, North Dakota in July, adopted a position supporting amendments to the Federal Power Act to assure that applicants for a hydropower license must comply with state water law. The position states that the FERC does not have the ability, experience or resources to regulate hydropower water rights. It also notes that FERC limits its review of a project to the record before it and does not perform a comprehensive analysis of existing and future uses of water within a river basin when issuing a license.

Western governors adopted a resolution, at their annual meeting in July, that calls on Congress to amend the Federal Power Act "to clarify the respective roles of state and federal governments." The resolution supports S.2805 and H.R. 5194, stating, "The Governors believe that these amendments will accomplish the goal of assuring that state water law is not preempted by FERC license conditions and that FERC's licensees comply with the procedural and substantive requirements of state law."

Senators James McClure (ID) and Tim Wirth (CO) have asked the Senate Energy Committee to schedule a hearing on S.2805, which would amend the Federal Power Act to restore to the states primary authority for regulating water use as it relates to hydropower projects.

Sources: U.S. Water News July, 1990; Western States Water 7/16/90 and 7/20/90; Water Rights 7/7/90, 8/17/90

WILDERNESS WATER RIGHTS DECISION REVERSED

The 10th U.S. Circuit Court of Appeals has vacated a decision by U.S. District Judge John Kane on water rights for wilderness areas. Kane ruled in 1984, in a suit brought by the Sierra Club, that the Wilderness Act of 1964 creates reserved federal water rights in all 24 wilderness areas created by the U.S. Forest Service. The appeals court ruled there was no immediate threat to wilderness-area water flows, and said Kane's decision was premature. The court did not, however, rule out the concept of a reserved federal water right for wilderness areas. "When and if a water development claim that may threaten wilderness water values is filed," and the U.S. Forest Service fails to assert a claim and fails to protect the wilderness character of an area, then the Sierra Club may intervene in either state water proceedings or bring the case to U.S. court, the appeals panel said.

Sources: Associated Press 8/15/90, Denver Post 8/14/90

CWCB SEEKS MIDDLE GROUND ON INSTREAM FLOW ISSUE

On July 17 The Colorado Water Conservation Board, by a 7-3 vote, decided to take a case-by-case approach when considering enforcement of its instream flow water rights. CWCB has obtained instream rights on 8,000 miles of Colorado streams and rivers, under a state law that would ensure minimum stream flows for fish population. These rights would be junior to most rights in the state, but senior to new water development proposals. The Board gave initial approval to a plan that would review each reservoir proposal separately. For each project the board would decide whether instream flow rights "may be adversely affected" if they were inundated by a dam. The plan is set for final approval in September.

Sources: US Water News, August 1990; Denver Post 7/11/90

CONGRESS APPROVES BILL TO PROTECT GRAND CANYON

H.R. 4498, which requires the Secretary of the Interior to stabilize Colorado River flows by establishing minimum and maximum releases to protect Grand Canyon National Park and Glen Canyon National Recreation Area, was approved by a House voice vote on July 30. Amendments by Representatives John Rhodes (AZ) and Ben Nighthorse Campbell will allow the Secretary of Interior "to take other reasonable mitigation measures, in addition to operational changes, to protect downstream resources. Further, operational changes shall not interfere with the primary water storage and delivery functions of the Glen Canyon Dam." The amended bill does not change the authorized purposes of the Colorado River Storage Act.

Source: Western States Water 8/3/1990

WATER DEVELOPMENT

Two Forks--The Denver Post reported on August 18 that federal approval of Two Forks Dam is "still an open

question," according to LaJuana Wilcher. Wilcher is the EPA Assistant Administrator who holds final veto power over the project. The Post reported that the EPA official is intrigued by a proposed smaller version of Two Forks and is asking that metro-area water providers supply more information on how they would mitigate environmental damage. Wilcher left Denver on August 17 after three days of talks with water providers and a tour of the Two Forks site, Cheesman Dam, Dillon Reservoir and other key Colorado water sources. Environmental groups consider the smaller, alternative Two Forks Dam just as objectionable as the original Two Forks proposal. Dan Luecke, of the Environmental Defense Fund, has asked to meet with Wilcher as part of the consultation.

Animas La Plata--Biologists have offered some alternatives to protect endangered Colorado squawfish without stopping the Animas La Plata water project. The alternatives discussed include re-regulation of the Navajo Dam and development of protected squawfish habitats in other rivers. Another alternative would be to purchase water rights to improve squawfish habitat in the Yampa, White and Gunnison Rivers. The biologists met twice in June at the request of the Bureau of Reclamation, which is formulating a response to a U.S. Fish and Wildlife Service draft blocking construction of the water project.

Source: Associated Press 7/14/90

Homestake II--A federal judge has refused to stop the cities of Aurora and Colorado Springs from taking 20,000 acre-feet of water annually from the Holy Cross Wilderness area. The two cities are cosponsors of the $91-million Homestake Project. The judge cited case law that says the Forest Service and Army Corps of Engineers, not the court, are empowered to decide whether a project will damage the environment. The cities argued that they will take only 13 percent of the water from Cross and Fall Creeks, but opponents say that's enough to upset the area's ecological balance.

Source: Denver Post 7/10/90

San Luis Valley--Following a day-long hearing on July 5, water judge Robert Ogburn rejected American Water Development Inc.'s historical claims to huge reserves of water under Colorado's San Luis Valley. AWDI, which controls the 105,000-acre Baca Grande Ranch, wants to pump water from the deep aquifer underlying the valley to supply Front Range water users. Its proposal, filed in December 1986, is to pump as much as 200,000 acre-feet annually from 92 wells that would be drilled on ranch property. Although the company has denied it, some critics say the water could be shipped to California cities via the Colorado River or to Texas via the Rio Grande.

AWDI lawyers have filed claim to the water under two premises: historical - that the property was granted to the original Baca family owners with rights to water and anything else on or beneath it; and technical - that the water is unappropriated and therefore open to claim. AWDI contends that the deep aquifer is non-tributary and is not connected to the shallower, runoff-fed aquifer that supplies local wells. More than 30 groups and individuals oppose the company's plan. Area residents' fears are based on projections of lowered water tables, decreased artesian pressure, and the drying up of wetlands in the valley. Other concerns of residents and state officials are the effect on the Closed Basin Project, designed to recapture water lost through evapotranspiration; and the effect on Colorado's obligation to supply water to New Mexico, Texas, and Mexico. Opponents even worry about Great Sand Dunes National Monument, where two Adams State College scientists are field-testing their theory that the dunes are held in place by the valley's high water table.

Whether pumping water from the deep aquifer will deplete shallower groundwater still must be argued in court, and Ogburn set a tentative trial date of October 15, 1991 for the case.

On August 7 AWDI announced a plan to give 20,000 acre-feet and 10,000 acres of land to an economic development joint venture with valley residents. AWDI President Dale Shaffer said the plan's details will be unveiled in a few weeks. Those details will show the project will not harm the environment or the area's farm economy, he said.

On August 21 the Associated Press reported that AWDI had filed an amendment to its water rights claim in Alamosa District Court that requests the water court to impose requirements on the water project to ensure the protection of local water supplies. And in the Denver Post it was reported that the company, hoping to quell local opposition, proposed to scale back the amount of water it would pump by 70 percent. It would pump 20 billion gallons a year, and half of that water would stay in the San Luis Valley for local crop irrigation. The report said the company concedes that their plan would slightly lower the San Luis Valley water table, but the company pledged to pick up any extra pumping or drilling costs for local residents.

Sources: Pueblo Chieftain 6/10/90, 7/6/90, 7/11/90; Denver Post 7/6/90, 7/22/90, 8/8/90, 8/21/90; Fort Collins Coloradoan 8/21/90

WATER CONSERVATION

Denver residents are volunteering at a record rate to have free water meters installed, says U.S. Water News. This summer, ten contract plumbing firms have been installing up to 475 meters a week. Residents representing about 11,000 taps a year have volunteered for the offer. Newly metered households are offered a free visit from a water conservation expert who conducts a water use audit of the house and offers free toilet dams, faucet aerators, and low-flow shower heads.

Fort Collins city officials hope residents will volunteer to have water meters installed in their homes. The city's Water Demand Management Committee has agreed to launch a metering program on a voluntary basis for one to three years. State law requires Fort Collins to install water meters in an estimated 19,800 existing homes that don't have them by the year 2009. The city will need to install 1,100 meters a year for each of the next 18 years to meet this deadline. All new homes constructed after July 1 of this year must also be

equipped with meters. Water meters are expected to reduce water use by an average of 15 to 20 percent throughout the city.

Sources: U.S. Water News, August 1990; Fort Collins Coloradoan 8/11/90

WATER QUALITY AND THE ENVIRONMENT

Toxic waste disposal remains the highest-priority concern of Americans, according to a recent national poll, with 65 percent saying it requires "urgent government action no matter what the cost." Drinking water pollution got the next highest priority. Nine in ten said they would support mandatory recycling, and nearly seven in ten supported creation of an elected statewide post to enforce environmental law. Californians will vote in November on a referendum called "Big Green," which contains provisions that had wide backing in the national poll and provides for such a state environmental post. Also supported in the national poll were other provisions of "Big Green:" a ban on 19 widely used pesticides (70 percent); imposing a fee on all shippers to fund oil-spill prevention and cleanup (80 percent); and a restriction on wood cutting in old forests (61 percent). The Media General-Associated Press poll was conducted May 11-20 among a random sample of 1,143 adults with a three-point margin of error.

Source: Rocky Mountain News 6/12/90

The **Pollution Prevention Partnership**, a group of four businesses, two government agencies, and two public-interest organizations, will work to reduce pollution in Colorado. The first goal is to reduce use of the solvent TCA, which is used to clean equipment and is found in typewriter correction fluid and also some household products. The group aims for at least a 70-percent reduction by 1992. The companies involved are Adolph Coors, Martin Marietta Astronautics Group, Hewlitt Packard, and Public Service Company of Colorado. Working with the businesses will be the U.S. Environmental Protection Agency, Colorado Department of Health, Colorado Public Interest Research Group, and League of Women Voters.

Source: Rocky Mountain News 6/29/90

Loveland--City officials report that an increasing amount of potentially hazardous materials has been found in the city's storm drainage and sanitary sewer systems. The materials include paint and paint thinner, varnish, motor oil, antifreeze, wood-stripping agents, pest control products, solvents, ammonia, bleach and pool-maintenance chemicals. In sufficient quantities these materials can produce methane gas and potentially cause an explosion, warn city officials. In addition, they may kill bacteria, algae and other organisms, disrupting the biological process used to treat sewage at the city's treatment plant. City officials warn that residents caught dumping substances into the sewer will be charged for cleanup and cost of making repairs to the system. They also could be fined up to $1,000 per incident per day, according to city ordinance. The Environmental Protection Agency and the State of Colorado can impose fines starting at $10,000 per day. Residents and businesses are urged to contact local hazardous waste collection sites to dispose of wastes and chemicals.

Source: Loveland Daily Reporter Herald 7/2-3/90

Rocky Flats--The Department of Energy has increased its cost estimates from $500 million to $1.1 billion to clean up environmental contamination and manage radioactive and toxic waste at Rocky Flats over the next five years. Leo Duffy, who heads the DOE's national environmental cleanup and waste management program, attributed the increase in part to concerns by DOE employees and private contractors who run the weapons plants around the country that they need to protect themselves against future charges that they were neglecting environmental and safety problems. DOE said it will also need twice as many people as previously thought to clean up the waste nationwide. Duffy said the lack of scientists and adequate technology are the biggest hurdles to cleaning up weapons plants.

Sources: Denver Post 7/4/90, Rocky Mountain News 7/4/90, 7/5/90

In mid-July the U.S. Senate Armed Services Committee stripped $65 million from the proposed 1991 defense budget designated for planning and design of a new plutonium recycling facility at Rocky Flats known as the Plutonium Recovery Modification Project (PRMP). Senator Tim Wirth was instrumental in getting the money deleted from the Senate measure with an amendment that transferred the $65 million to environmental restoration projects at Rocky Flats. About $34 million would go to protect community water supplies from contaminated runoff at Rocky Flats. On July 1 Wirth and representatives of the cities of Arvada, Broomfield, Northglenn, Thornton and Westminster met at the plant to give Wirth a "better sense" of which water quality options the cities preferred to ensure that drinking water remains safe for cities downstream from the plant. An aide to Representative Pat Schroeder said it appears likely the House will also delete the item. The aide also noted that the entire Colorado delegation voted against financing the plutonium recycling facility when Schroeder attempted to kill it in an earlier budget measure. She has said she will introduce legislation this year to phase out Rocky Flats by the year 2000.

Sources: Denver Post Washington Bureau 7/14/90, Rocky Mountain News 7/1/90.

The Associated Press reported on July 14 that DOE has signed an agreement giving the Army Corps of Engineers a role in helping correct environmental damage at nuclear weapons plants. The Corps will provide management help including cost estimates and technical assistance in planning and building waste cleanup projects.

Rocky Mountain Arsenal--Despite assurances from EPA that residents face no threat from their drinking water, 71 families who live north of the Rocky Mountain Arsenal will receive bottled water supplied by the Colorado Department of Health. Tests conducted by state health officials in May showed DIMP contamination in wells at concentrations of 0.2 parts per billion to 248 parts per billion. DIMP, dissopropylmethyl phosphate, is a nerve gas byproduct. State

health officials say DIMP does not cause short-term toxic health effects at the levels that have been detected in the wells, but the long-term effects are unknown. Area residents have demanded that the U.S. Army and Shell Oil Company remove byproducts of nerve gas from area well water.

Sources: Denver Post 7/27/90, Associated Press 7/28/90, Rocky Mountain News 8/8/90

Eagle County--At a July 12 news conference Eagle County Commissioners criticized cleanup of the Eagle Mine south of Minturn and called for reopening of a lawsuit settled between Paramount Communications and the state. The commissioners called for a permanent treatment facility and removal of 8 million tons of mine tailings to another location. Minturn Town Manager Kent Mueller said the possibility that contaminated groundwater from the tailings pile could seep into Minturn's municipal wells concerns him most. In early July a trench built to keep clean water away from the tailings pile was found to be carrying a heavy load of metal contamination into nearby wetlands.

Martin Marietta--Under a cleanup plan proposed by EPA for land and water at Martin Marietta, contaminated soil will be treated on-site through a heating process and the cleansed soil redeposited and capped. Groundwater will be pumped out, treated and then reinjected into the ground or released into streams. A two-month public comment period for the plant began on June 28.

Sources: Denver Post 6/28/90, Rocky Mountain News 6/28/90

Elizabeth--To allay community concerns about pollution from buried toxic waste, investigators are monitoring groundwater quality in local wells and nearby Boxelder Creek. EPA and FBI investigators found that electrical equipment, illegally buried, had leaked PCBs into the soil. Although the chemical does not move rapidly in soil, Steve Hawthorn of the EPA said "We'll drill wells to test the water quality so everyone feels a little safer." Weaver Electric Company of Adams County is suspected of burying the equipment to avoid paying for legal disposal.

Source: Rocky Mountain News 7/19/90

COLORADO WATER: THE NEXT 100 YEARS
September 8, 1990

A special program is scheduled in Fort Collins on September 8 for citizens who care about future uses of Colorado's water. These programs are being held in each of the state's seven water divisions during 1990. The programs, free to the public, will include informtion on the history, cultural, and economic values of water use. They will also include discussions on the evolution of cultural values and current attitudes regarding conservation practices, water quality, socioeconomic issues surrounding water use, and the impact of water legislation. As a participant, you will receive a free copy of the ***Colorado Citizens' Water Law Handbook*** as well as a copy of the final report which will include program summations. The program will include videos: **Ripple Effect: Water in the West** (KMGH, Channel 7, Denver) and **Water Transfers: An Arizona Civil War** (produced by University of Arizona, Tucson 1990); and a slide talk on **Use of Water by Ancient Civilizations** by Dr. William Buckles, Anthropolist, University of Southern Colorado. Scheduled speakers are: Ward Fischer, Attorney; Alan Berryman, Water Division 1 Engineer; George Vranesh, Attorney and Engineer; W. D. Farr, Director, Northern Colorado Water Conservancy District; Neil S. Grigg, Director, CWRRI; Sara Duncan, Attorney, Denver Water Board; Bill Bohlender, Attorney, Greeley; Ben Saunders, Manager, Groundwater Districts; Steve Norris, Colorado Environment 2000; Tom Cech, Central Colorado Water Conservancy District; Dr. Charles Howe, Economist, University of Colorado; Chris Meyer, National Wildlife Federation; Paul Ohri, Commissioner, Grand County; and Dan Tyler, Historian, Colorado State University.

Lunch: $7.00. For information contact: Barbara Preskorn, Project Director, Front Range Community College, 3645 W. 112th Ave., Westminster, CO 80030 (303)466-8811, ext. 434.

CHWMS 4TH ANNUAL CONFERENCE AND EXHIBITION

Colorado's Hazardous Waste Society will present its 4th Annual Conference and Exhibition on October 18-19, 1990 at the Holiday Inn I-70 East Convention Center (I-70 & Chambers Road), 15500 E. 40th Ave., Denver. There will be two days of concurrent sessions covering many important issues and technologies of the hazardous waste industry, including: waste minimization; hazardous waste database management; legal/regulatory aspects; remedial investigation; treatment technologies; health and safety; and laboratory technologies.

Keynote speaker will be Mr. Robert Nelson, Manager of DOE Programs, Rocky Flats. Thursday's luncheon program will feature a panel discussion, "Risk Communication," with panel members Ellen Mangione, Colorado Department of Health; Dan Luecke, Environmental Defense Fund, Chuck Bennet, Coors Brewing Company; and Paul Day, KCNC-TV Channel 4, Moderator. Luncheon speaker on October 19 will be Mr. Peter B. Teets, President, Martin Marietta Astronautics Group.

The conference is cosponsored by The University of Colorado, Colorado State University, Colorado School of Mines, Front Range Community College, the Environmental Protection Agency, and the Colorado Department of Health. For further information contact: Mark Atwood, (303)232-9533, Registration; Tom Sutton, (303)288-8703, Exhibits; or Cindy Leap, (303)295-8000, CLE Credit.

CALL FOR PAPERS

THIRD ANNUAL CONFERENCE ❧ COLORADO SECTION
AMERICAN WATER RESOURCES ASSOCIATION

WATER PROJECT DEVELOPMENT AND FINANCING IN THE 1990's

FEBRUARY 1, 1990 ❧ DENVER, COLORADO

The Colorado Section of AWRA and the Colorado Water Resources Research Institute will host an all day symposium on February 1, 1991. The purpose of the 1991 symposium is to provide a forum to discuss the initial planning, permitting and financing considerations of water project developments. You are invited to submit an abstract for a policy or technical paper which focuses on future prospects on any of the following topics:

- The Evolution of the Planning Process
- Planning for Future Water Supplies
- Alternatives to New Project Development
- The Economics of New Project Development
- The Bond Market Outlook
- Alternative Funding Sources
- Environmental Permitting Considerations
- The Changing Role of Local, State & Federal Agencies
- Public, Professional & Media Perceptions of Water Development

The deadline for submission of abstracts is October 15, 1990 and should be sent to Conference Chairperson, Kate Berry, at the address below. Abstracts should be less than 200 words and include all authors' names and affiliations. The submitting author must include their full mailing address and telephone number. Acceptance notification will be made by November 1, 1990. All attendees, including authors, will be expected to pay the registration fee for the meeting.

Papers, subject to acceptance, will be published in a proceedings to be distributed at the conference. Papers will be limited to 6 pages. **All papers must be received no later than December 15, 1990.**

Conference Chairperson:
Kate Berry
AWRA – Colorado Section
P.O. Box 9881
Denver, Colorado 80209
Telephone: 320-4400
Fax: 320-4491

AWRA -- COLORADO SECTION

presents

TRANSIT LOSS MODEL AND SUBSURFACE RETURN FLOW PROGRAM

Thursday, October 4, 1990

6:30 Cash Bar
7:00 Dinner
7:45 Program
Colorado Springs Sheraton - North
I-25 and N. Academy Boulevard
8110 N. Academy Boulevard
Members $14.00, Non-members $16.00

AWRA-Colorado Section will host a two part evening dinner program in Colorado Springs on Thursday, October 4. Doug Cain and Gerald Kuhn of the U.S. Geological Survey, Pueblo Subdistrict will present the development and application of a methodology to determine transit losses for return flows of transmountain water in Fountain Creek between Colorado Springs and the Arkansas River. Philip Saletta, Senior Resource Engineer with the City of Colorado Springs Water Department, will present results from the Colorado Springs Lawn Irrigation Return Flow Study. This presentation will include background on the City's recent exchange and augmentation plan filings as well as a description of the design, analysis and results of their lysimeter study.

Please make a reservation for me at the October 4th program:

Name: _____ Affiliation: _____

Address: _____ Phone: _____

The main course will be Breast of Chicken Parmesan. Please send your reservation form and check (please no P.O.s) no later than September 28 to:

AWRA-Colorado Section
P.O. Box 9881
Denver, CO 80209-0881

For more information, call Gary Bostrom at (719) 636-5685 or Ed Rovey at (303) 433-9125.

CALLS FOR PAPERS

International Seminar on Efficient Water Use, Oct. 21-25, 1991, Mexico City, Mexico. Contact: Secretariat of the Seminar, Instituteo Mexicano de Tecnolgia del Agua, Paseo Cuauhnahuac 8532 Col Progreso, Jiutepec, Morelos C.P. 6550, Mexico. Abstracts due: Nov. 15, 1990.

14th Annual Meeting, Association for Arid Lands Studies, April 24-27, 1991, Reno, NV. Contact: Claud Davidson, Dept. of Geography, Box 4020, Texas Tech University, Lubbock, TX 79409. Abstracts due: Dec. 1, 1990.

Nonpoint Source Pollution Conference, Mar. 20-21, 1991, Tacoma, WA. Contact: State of Washington Water Research Center, Washington State University, Pullman, WA 99164-3002. Phone: (509)335-5531; FAX: (509)335-1590.

Urban Drainage and New Technologies, June 17-21, 1991, Dubrovnik, Yugoslavia. Contact: K. M. Strzepek, Dept. of Civil Engineering, University of Colorado, Boulder, CO 80309.

POSITIONS AVAILABLE

Water Quality Extension Specialist - Colorado State University. This is a 12-month general faculty (non-tenure track) position with 100 percent Cooperative Extension Responsibilities. Annual funding is provided through the newly adopted Colorado Ground Water Protection Act. The purpose of the position is to implement the educational provisions of the Act. The appointee will be affiliated with an appropriate academic department including agricultural and chemical engineering, agronomy, entomology or plant pathology and weed science.

The appointee will work as a member of a team of professionals, under the supervision of the respective department head and the Cooperative Extension assistant director, agriculture and natural resources. Duties include but are not limited to:

- training agricultural chemical users on current regulations and best management practices for chemical use including non-chemical alternatives designed to protect water quality;
- training agency personnel and the general public as described above;
- developing and distributing a compilation of best management practices, both hard copy and audio/visual;
- cooperating and interacting with other Extension personnel and agencies including the Colorado Department of Agriculture, Colorado Department of Health, Soil Conservation Service, Colorado Association of Soil Conservation Districts and Environmental Protection Agency;
- interacting with Colorado State University researchers and federal researchers including the Agricultural Research Service and U.S. Geological Survey;
- maintaining effective communication with all interested parties; and
- providing leadership and assistance with other activities as assigned.

Salary commensurate with educational level and prior experience. Deadline: New position. Applications (organization application form required) and transcripts of college course work must be received or postmarked no later than September 21, 1990.

Head, Agricultural Engineering Department, University of Idaho - Applications will be accepted up to Oct. 31 1990 or until position is filled. Administers departmental teaching, research and extension programs in Agricultural Engineering and Agricultural Mechanization and coordinates cooperative programs with the Washington State University Agricultural Engineering Department. Candidate must have a Ph.D in agricultural engineering or related field and several years experience in teaching, research or extension programs. U.S. citizenship or permanent residency required; professional registration desirable. Send application to: George Bloomsburg, Search Committee Chairman, Agricultural Engineering Dept., University of Idaho, Moscow, ID 83843. Include a resume and list of five references.

Director, International Ground Water Modeling Center, Butler University's Holcomb Research Institute, Indianapolis, IN. Responsible for the technical and fiscal expansion of the Center's current programs and the development of new programs including technology transfer, training, research and marketing programs, and obtaining funding for these activities. Qualifications include Ph.D degree in groundwater hydrology or a related field and at least five years additional experience. Submit a letter indicating interest, curriculum vitae, and the names, addresses and phone numbers of at least three references to: Patricia Bacon, Personnel Director, Butler University, 4600 Sunset Ave., Indianapolis, IN 46208.

The Center also has positions available as: Hydrogeologist/Modeler and Head, Clearinghouse; and Research Assistant in Groundwater Modeling.

Assistant/Associate Cooperative Extension Specialist in Groundwater Quality - Kearney Agricultural Center, University of California, Parlier (near Fresno). This is an academic career-track position, subject to 3-year administrative review for reappointment, in the Department of Land, Air and Water Resources, University of California, Davis. This position is to develop and implement strategies for reducing and preventing groundwater contamination through extension teaching and applied research.

A Ph.D in geology, engineering, hydrology or a closely related field is required. Background and interest in water

quality, contaminant transport, and remedial measures are desired. Salary is commensurate with experience and within the Assistant/Associate Cooperative Extension Specialist rank in the University of California. Date available is January 1, 1991.
Applications and inquiries should be directed to Blaine Hanson, Search Committee Chair, Cooperative Extension Specialist position is Groundwater Quality, Land, Air and Water Resources, University of California, Davis, California 95616, telephone (916) 752-1130. Applications should include a resume, official undergraduate and graduate academic transcripts; statements of research and teaching interests and experience; copies of publications, and reports; a summary or abstract of the Ph.D dissertation; and names, addresses, and telephone numbers of at least three references. Applications will be received until October 1, 1990.

Assistant Professor, Dept. of Natural Resource Sciences - College of Agriculture and Home Economics, Washington State University, Pullman, Washington. The position is a permanent 9-month (75% teaching/25% research) tenure track position beginning January 1, 1991 or later.

Qualifications include: 1) Ph.D in a natural resource discipline (e.g. forestry, range management, wildlife management) with emphasis on water resources or a Ph.D in a water resource science field with a strong emphasis on forest or rangeland related research is required. 2) At least one degree in a natural resource discipline is required. 3) Demonstrated expertise in the areas of watershed and riparian zone ecology/management is required. 4) Ability to address watershed and riparian zone issues in the context of natural resource management in the Pacific Northwest. 5) Demonstrated skills in the application of quantitative techniques to analyze and evaluate water resource phenomena, problems, and management opportunities are required. 6) Ability to teach an undergraduate course in woody plant identification and ecology. 7) Ability to teach and conduct research in an interdisciplinary setting is required. 8) Ability to secure extramural funding is required.

Salary is competitive and commensurate with qualifications and experience. Application deadline is October 15, 1990. Letter of application including a summarization of future professional goals, curriculum vitae, transcripts, and names and addresses of five references. Five confidential letters of reference focused on the candidate's ability to meet the above qualifications are to be solicited by the applicant and forwarded by the references directly to the chair of the search committee by Oct. 15, 1990. Send applications to: Benjamin A. Zamora, Chair of Search Committee, Dept. if Natural Resource Sciences, Washington State University, Pullman, WA 99164-6410.

MEETINGS

Sept. 17-28	AMERICAN WATER FOUNDATION 1990 INTERNATIONAL SEMINAR AND WORKWHOP - HYDROPOWER DESIGN, CONSTRUCTION AND EQUIPMENT REQUIREMENTS, Denver, CO. Contact: American Water Foundation, P.O. Box 15577, Denver, CO 80215.
Sept. 24-26	42ND ANNUAL NATIONAL CONVENTION AND EXPOSITION OF THE NATIONAL WATER WELL ASSOCIATION, Anaheim, CA. Contact: Alice Vickerman, 6375 Riverside Dr., Dublin, OH 43017 (614)761-1711.
Sept. 30-Oct. 5	NORTHERN ROCKY MOUNTAIN WATER CONGRESS, Butte, MT. Contact: Brenda C. Sholes, Hydrology Division, Montana Bureau of Mines and Geology, Montana Tech, Butte, MT 59701 (406)496-4152.
Oct. 4-5	CLIMATOLOGY AND FLOOD HYDROLOGY IN THE ROCKY MOUNTAINS, Lakewood, CO. For Program Information contact: Dr. Robert D. Jarrett, USGS, Denver, Colorado (303)236-6447 or Dr. John Y. D. Liou, FEMA, Region VIII, Denver, CO (303)235-4830; For Conference Information contact: Mr. Douglas R. Laiho, Delta Environmental Consultants, Inc., 1333 W. 120th Ave., Suite 115, Denver, CO 80234 (303)452-3600.
Oct. 14-18	ASSOCIATION OF STATE DAM SAFETY OFFICIALS 7TH ANNUAL CONFERENCE, New Orleans, LA. Contact: ASDSO, P.O. Box 55270, Lexington, KY, 40555-5270, 606/257-5140.
Oct. 18-19	35TH ANNUAL MIDWEST GROUNDWATER CONFERENCE, Lincoln, NE. Contact: Perry B. Wigley, Director, Cons. and Survey Div., Univ. of Nebraska, 113 Nebraska Hall, Lincoln, NE 68588-0517 (402)472-3471.
Oct. 28-Nov. 1	THIRD NATIONAL IRRIGATION SYMPOSIUM - VISIONS OF IRRIGATION - TECHNOLOGY TO ENRICH OUR ENVIRONMENT, Phoenix, AZ. Contact: ASAE, 2950 Niles Rd., St. Joseph, MI 49085-9659 (616)429-0300.
Oct. 29-Nov. 1	ANNUAL MEETING, GEOLOGICAL SOCIETY OF AMERICA, Dallas, TX. Contact: Geological Society of America, 3300 Penrose Place, P.O. Box 9140, Boulder, CO 80301 (303)447-2020 or (800)472-1988.
Oct. 31-Nov. 16	AMERICAN WATER FOUNDATION 1990 INTERNATIONAL SEMINAR AND WORKSHOP; DAM SAFETY, OPERATION AND MAINTENANCE, Denver, CO. Contact: American Water Foundation, P.O. Box 15577, Denver, CO 80215.
Nov. 4-9	26TH ANNUAL AWRA CONFERENCE - THE SCIENCE OF WATER RESOURCES: 1990 AND BEYOND, and SYMPOSIA- TRANSFERRING MODELS TO USERS & URBAN HYDROLOGY, Denver, CO. Contact: AWRA, 5410 Grosvenor Lane, Suite 230, Bethesda, MD 20814-2192 (301-493-8600.

Nov. 5-8 1990 ANNUAL CIVIL ENGINEERING CONVENTION AND EXPOSITION, MEETING THE NEEDS OF SIX BILLION PEOPLE, San Francisco, CA. Contact: American Society of Civil Engineers Conventions, 345 East 47th St., New York, NY 10017.

Nov. 8-9 PESTICIDES IN THE NEXT DECADE; THE CHALLENGES AHEAD, Richmond, VA. Contact: Diana L. Weigmann, Water Resources Research Center, Virginia Polytechnic Institute and State University, 617 North Main St., Blacksburg, VA 24060-3397 (703)231-5624.

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Colorado Water Resources Research Institute
Colorado State University
Fort Collins, Colorado 80523

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