

## Wilson, Zimbelman New USCID Officers

David S. "Sid" Wilson, Jr. was elected President of the USCID Board of Directors during the 1991 Annual Meeting of the Board, succeeding William C. Klostermeyer, who had served as President for an unprecedented six years. Wilson heads the Phoenix office of Bookman-Edmonston Engineering, Inc. The Annual Meeting was held January 31, in El Paso, Texas.



Sid Wilson (left) receives congratulations from Bill Klostermeyer

Darell D. Zimbelman, Assistant Manager of the Northern Colorado Water Conservancy District, was elected Secretary, succeeding E. Gordon Kruse, who was Secretary for three years. The other members of the USCID Board are Allen R. Dedrick, Harald D. Frederiksen, Herbert W.

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## USCID/Summers Engineering Scholarship Awarded

William L. Veydovec, a Senior in Civil Engineering at the University of Colorado, has been named recipient of the 1991 USCID/Summers Engineering Scholarship — a \$500 award. Nominated by Professor J. Ernest Flack from the University's Department of Civil, Environmental and Architectural Engineering, Veydovec has been involved in several water supply research projects and has a 3.1 grade point average. Flack reports that Veydovec is "an outstanding student and one of our most deserving seniors."

The USCID/Summers Engineering Scholarship was initially endowed by a generous contribution from long-time USCID Member Joseph B. Summers, President of Summers Engineering, Inc. in Hanford, California. The scholarship fund continues to grow, thanks to contributions from many USCID Members. Additional contributions are invited. □

## USCID Plans National Conference

USCID recently announced that the Committee will hold a National Conference on the theme **Irrigation and Water Resources in the 1990's**. The Conference will be held October 8 to 10, 1992, in Phoenix, Arizona.

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## President's Message Sid Speaks

**Dear USCID Members:**

I'm writing this letter as I sit in my office looking out on another hot, sunny Phoenix afternoon. So what, you shrug, but — this is October 23rd and it should be cooler by now! However, it seems appropriate weather to reflect on the past few months of USCID activity and for anticipating our November 12th Technical Conference on Irrigation, Drainage and Flood Control.

Your Board of Directors and Executive Vice President, Larry Stephens, have really warmed to the task of making our organization vital, responsive to your needs and financially sound.

Since its inception in 1951, USCID has been closely linked to the Bureau of Reclamation for financial, staff and facility support. This relationship was established and maintained without the benefit of a formal agreement. Recent federal-level changes resulted in a reduction from historic levels of support. The Bureau's commitment to USCID remains strong and USBR has become a Sponsoring Organizational member through September, 1992. There are provisions to renew their membership annually through September 1996.

In April, USCID entered into a consulting services agreement with Larry Stephens to serve as the Committee's paid Executive Vice President. Larry located an office at 1616 Seventeenth Street, Suite 483,

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**UNITED STATES COMMITTEE  
ON  
IRRIGATION AND DRAINAGE**

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**President Message's (Continued)**

Denver, Colorado. He hired Darla Leslie, a nice lady, to direct the Membership and Publications programs.

With these changes came the challenge of managing a tighter budget. The Board and Secretary Darell Zimbelman rose to the occasion. I am proud of their effort and result. A budget was adopted that will permit the continued excellence of our organization and provide the opportunity for greater achievement. We are focused on our purpose "to promote the free exchange of ideas, improve technical practices and create a better understanding of irrigation engineering, drainage, flood control and irrigated agriculture." In support of that focus, we have:

- Gone to the printer with a new brochure that explains what our organization is about
- Granted the second USCID/Summers Engineering Scholarship to University of Colorado student, William L. Veydovec
- Scheduled an outstanding 12th Technical Conference, in cooperation with ASAE, ASCE and the Soil Science Society of America, in San Francisco, California – November 13-16, 1991
- Started planning for the 1992 National Conference in Phoenix, Arizona, October 8-10, 1992
- Positioned members in key assignments within the ICID organization

I'm excited about the future of our USCID. It's a time of change and opportunity. So let's hear from you! Come to the San Francisco meeting! Plan to come to Phoenix in 1992! Send your news items to Larry for our newsletter! Recruit a new member!

Professionally yours,

Sid

David S. Wilson, Jr.

President, USCID

**Please Volunteer  
Membership,  
Publications  
Committees Need  
Members**

Two USCID Standing Committees, Membership and Publications, are being reactivated. Both chairmen and members of these committees are needed.

While all USCID Members are urged to help recruit new members, the Membership Committee serves as a focal point for USCID's new member recruiting efforts. New members are vital to the long term viability of any volunteer organization, and USCID is certainly no exception. The chairman of the Membership Committee is asked to serve for only one year, while committee members are asked to serve three year terms.

The primary function of the Publications Committee is to provide news and technical articles for the *USCID Newsletter*. This committee also seeks U.S. articles for the *ICID Bulletin*. Appointments to the Publications Committee are for three years. The USCID staff in Denver provides copy about USCID and ICID activities, then does the typesetting and coordination to get the Newsletter printed and mailed.

Please volunteer to serve as chairman or member of one of these committees – help is urgently needed!

**USCID Conference  
(Continued)**

Topics for the Conference include:

- New Technologies in Irrigation and Drainage
- Rehabilitation, Operation and Maintenance
- Conservation versus Development
- Environmental Issues

A Call for Papers will be mailed to all USCID Members in the near future. Plan to prepare a paper and/or attend this important U.S. meeting.



## Reclamation Joins USCID

The Bureau of Reclamation, well known internationally as a leading U.S. water resources organization, recently became a Sponsoring Organizational Member of USCID.

The sponsoring membership gives Reclamation and USCID an opportunity to cooperate in new programs of mutual interest and benefit. In addition to facilitating improved technology transfers between the Bureau and other U.S. and international water resources interests, USCID will organize technical workshops or seminars that address areas of importance to Reclamation.

In addition to the new sponsoring member grade, the USCID Board also established a sustaining member grade. Both grades are open to all public and private U.S. organizations. The Board is optimistic that the new membership grades will allow USCID to further improve as a leader in irrigation and drainage technology transfer programs. Please contact USCID for more information about the new organizational memberships. □

## USCID Proceedings Available

USCID held three important meetings during 1989. Two Regional Meetings, held in Boise and St. Louis, addressed the topic **Planning for Water Shortages**; and a Seminar, held in Sacramento in cooperation with the Bureau of Reclamation, addressed the subject **Controlling Toxic Substances in Agricultural Drainage – Emerging Technologies and Research Needs**.

Earlier this year, a Regional Meeting on groundwater – **Can Irrigated Agriculture Survive the Groundwater Crisis?**, was held in El Paso. Proceedings from these meetings are now available. An order form for all USCID publications has been included with this Newsletter mailing, along with a list of ICID publications for sale.

The theme of the Boise Regional Meeting was **Water Reallocations and**

**Transfers**, while the St. Louis Meeting reviewed **Drought Management**. Among the topics were water marketing, stochastic programming model, structural solutions, water transfer administration, economic and environmental impacts, water banking, drought predictions, supplemental irrigation systems, groundwater banking, reservoir shortage and operating criteria, benefits of irrigation and case studies. *Planning for Water Shortages* is 273 pages in length, includes 27 technical papers, and costs \$20 for USCID Members, \$40 for non-members.

Papers for the Sacramento Seminar included the following topics: efforts to solve drainage problems, wildlife implications of evaporation ponds, alternative irrigation strategies, treatment processes, agroforestry management and evaporation ponds for drainage disposal. *Controlling Toxic Substances in Agricultural Drainage* is 149 pages, includes 14 technical papers and is available to Members for \$18 and to non-members for \$36.

Papers for the El Paso Regional Meeting addressed conjunctive use of water supplies, water resources management, treating sewage for irrigation, groundwater banking, groundwater recharge, groundwater management and irrigation management services. *Can Irrigated Agriculture Survive the Groundwater Crisis?* includes 128 pages and 12 technical papers. The cost for Members is \$18, and is \$36 for non-members. □

## River Sedimentation Course at Colorado State University

Albert Molinas and Maurice Albertson of Colorado State University are planning a course, "Reservoir Sedimentation: Its Analysis and Control", for the spring of 1992, with USCID as a co-sponsor. The course is designed for persons actively involved in the design, operation, and/or management of water storage systems. Lectures by several experts will be offered. □

## Frank J. Trelease



Frank J. Trelease died in his Cheyenne, Wyoming, home on Saturday, July 21, 1990, after a long illness. Mr. Trelease was a Life Member of USCID and Member of the Board of Directors.

He had broad experience as a water resources engineer in Colorado and Wyoming, having worked for the Denver Water Board, the Colorado Water Conservation Board, the Bureau of Reclamation and the Wyoming Natural Resources Board. Mr. Trelease was Vice President of Wright Water Engineers from 1978 through 1985 and was Assistant Wyoming State Engineer at the time of his death. He was a Registered Professional Engineer in three states and active in several professional societies. His leadership will be missed by his many professional colleagues and friends.

Memorial contributions in Frank's name for the Cheyenne Rotary Club Foundation or the Wyoming Engineering Society Past President's Scholarship may be mailed to Pat Trelease at 3228 Locust Drive, Cheyenne, Wyoming 82001. □

## Los Osos Valley Groundwater Study

A cooperative groundwater investigation has been completed and reported in *Geohydrology and Management of Los Osos Valley Ground Water Basin*, San Luis Obispo County, California. The cooperators are the U.S. Geological Survey, San Luis Obispo County Flood Control and Water Conservation District and California Department of Water Resources. The study involved modeling the ground water basin and estimating long-term sustainable yield of the basin for various management alternatives. Data in the study affirm that a tertiary waste water treatment plant would benefit the basin; the treated water would meet standards commensurate with those for ground water recharge. □

# Environmental Role of Irrigation in Balanced Third World Development

by Maurice Albertson, Professor of Civil Engineering, Colorado State University

## Introduction

In order to get a perspective on the size of the so-called "developing nations" (the Third World), where most of the world's irrigation takes place (see Table 5) it is well to look at the population involved. The following shows that the entire world is about 5 billion people and the Third World makes up nearly 80 percent of this total.

### Population Figures (in billions)

The entire world	4.92	100%
Asia (without Japan)	3.08	62%
Africa	0.56	12%
South America	0.28	6%
Total Third World	3.87	79%
Villagers in Third World (= 80 percent — the "rural poor")	3.10	63%

Since the people in the rural villages of the Third World make up about 80 percent of the Third World population, these villagers (the so-called "rural poor") constitute nearly two-thirds of the entire world population. This should bring home the magnitude of the problem confronting the world today, especially since most of the rural poor are living at a subsistence level or below.

This situation has been made even worse by the fact that the billions of dollars which have been poured into the Third World countries through gifts and loans have benefited only the upper 10 to 20 percent of the population in each country and have provided little or no benefit to the villagers to help lift them out of their poverty situation.

## World Food Outlook

The world food outlook is intimately related to irrigation. This outlook is alarming today because of certain trends which have been taking place

since 1950. This is illustrated by the production, import and export of grain as follows:

(See also Table 1, Table 2 and Table 3.)

1. Africa has moved from being self sufficient in grain in 1950 to importing 28 million metric tons in 1988.
2. Asia imported 6 million metric tons in 1950 but imported 89 million metric tons in 1988.
3. Eastern Europe and USSR was self-sufficient until 1970 but imported 27 million metric tons in 1988.
4. Latin America went from exporting one million metric tons in 1950 to importing 11 million in 1988.
5. North America steadily increased exports from 23 million metric tons in 1950 to 131 million metric tons in 1980 but has dropped to 119 million metric tons in 1988.
6. The exportable surplus produced in the U.S. has dropped steadily from 144 million metric tons in 1985 to minus 10 in 1988 because of the drought in 1988 and because nearly 8 million hectares of land have been taken out of production.
7. The carry-over stocks of grain worldwide have dropped steadily since 1986 from 101 to 54 days consumption equivalent in 1988 (the lowest in a quarter of a century) because the world consumption has increased 20 million metric tons and the world production has decreased 161 during this same period of time. When the carry over stocks dropped to 57 in 1972, the world grain prices doubled.
8. Since the rural villages of the Third World make up two-thirds of the total world population, and the Third World is importing most of the grain, it is these people who will be hit the hardest from a worldwide grain shortage. They are also the ones least able to pay for imports in hard currency.

The foregoing facts dramatically illustrate the importance of water for irrigation in the Third World. Irrigation is the only way to ensure crop production against drought, and a very important way to increase production on dry land.

## Irrigation in the Third World

North America has been the primary exporter of grain to the entire world for two reasons:

1. The vast area available for grain production.
2. The production per hectare, which is primarily a result of four factors:
  - High yielding seeds
  - Optimum fertilizer use
  - On-farm management of inputs
  - Proper drainage of the soil

In the Third World there are also vast areas for crop production, but much of this land is producing only one-half to one-third the crop yield that is possible. For the irrigated areas (e.g. the Punjab in India and Pakistan) this is caused by inadequate drainage of the soil. Although the new high-yielding seeds have been introduced, they add a complicating factor — they are more sensitive to inadequate management. These seeds require very carefully controlled planting, fertilizer application and water application. Unfortunately, most Third World farmers are not accustomed to such stringent requirements and greatly reduced yields are the result. In many areas there is irregular leveling of the soil and therefore the application of water is non-uniform, which results in too much water in some areas and too little water in other areas. The application of chemical fertilizer is also frequently non-uniform. Both of these result in reduced yields. Inadequate drainage is also a problem which reduces the yield. This situation can be improved to some extent by widespread and intensive educational programs for the farmers. However, improvement in the agricultural sector cannot be accomplished in isolation from other sectors that also need development because they interact with and reinforce each other.

In the past, there has been a steady increase in irrigated acreage throughout the world (see Table 5) which has resulted in increased food production. However, the percent growth in acreage under irrigation in Asia has dropped from 52 percent for 1950-60 to 8 percent for 1980-85, and a similar drop has

occurred on other continents. Future increases in food production must result from more efficient irrigation and perhaps from irrigating the deserts of the world with partially or completely desalted seawater. Floating platforms on the ocean may also be used eventually for food production.

### Sources of Water

Sources of water for irrigation are usually from:

1. Gravity flow from streams, lakes, and storage reservoirs and tanks into open channels and pipelines.
2. Pumping from ground water or surface water.

The gravity flow requires initial construction but there is only a small amount of energy consumption in operation and maintenance. With pumping, however, considerable energy is required which is usually provided by people, by electricity with a motor, or by fossil fuel and an engine. Producer gas from bio-mass, and methane from bio-gas generators, are also used in some Third World countries. These sources of energy, however, are frequently not feasible because of expense, inconvenience or unavailability. Consequently, photovoltaic (PV) solar energy is becoming more and more attractive as a source of energy for pumping water for irrigation as well as for domestic and industrial uses.

Only a few years ago, the cost of PV energy was ten to twenty times the cost of energy using fossil fuels. Today the cost of PV energy is about twice that of fossil fuels and is still going down. Consequently, PV energy is already quite feasible for many energy requirements. Without question, PV energy is destined to become a primary source of energy for many requirements, including pumping water for irrigation. The PV energy, together with solar thermal energy, may also make it economically feasible, within a few years, to partially or completely desalt seawater for irrigation. This would then open up vast new desert areas for irrigation and food production, but it would also open up a

new source of water for many Third World villagers.

Unfortunately, however, many ground water supplies today are being pumped out for irrigation more rapidly than they are being replenished. This will ultimately cause a reduction in water available to irrigation in those areas.

### Energy and Fertilizer

A complicating factor for irrigation expansion is the large amount of energy that is consumed by irrigation, as shown in Table 4. With the heavy stress that will be placed in the future on all sectors of the world economy to reduce the use of non-renewable and polluting sources of energy, this will put an added burden on irrigation. Note that irrigation in 1985 required 201 million barrels of oil equivalent of energy, which is a steady and significant increase over previous years.

Likewise, chemical fertilizer adds greatly to energy consumption. Note that three times as much energy was consumed in the manufacture of chemical fertilizer as for irrigation. It is quite predictable that organic agriculture will become necessary as a general practice worldwide within the next few decades. The use of agricultural organic wastes to make compost for conditioning and fertilizing the soil is also an important part of organic agriculture. Much of these wastes today are being burned as fuel for cooking and heating in the Third World. The Rodale Institute, as well as others, has clearly demonstrated that this type of agriculture, which is non-polluting to the soil, drainage water and ground water, can be an economically viable form of agricultural practice.

The use of wastes from sewage can be used very beneficially for irrigation water and fertilizer — especially when the irrigated fields are near human settlements, see Brown, 1987, p.47. These consist of:

- Gray water from households
- Effluent from primary treatment of sewage
- Effluent from secondary treatment of sewage
- Effluent from tertiary treatment of sewage

- Effluent from sewage lagoons
- Solids from sewage treatment plants
- Raw, untreated solids, e.g. "nightsoil"
- Dried solids from a two-chamber outhouse
- Solids from bio-gas generators

The gray water and effluent from secondary and tertiary treatment of sewage is usually free of pathogens, but the water from primary treatment and lagoons, and the solids from some treatment plants and the untreated solids have pathogens and must be used where the pathogens will not cause a problem. The dried solids from a two-chamber outhouse, and the fully digested solids from treatment plants and bio-gas generators, are free of pathogens. These wastes are excellent sources of irrigation water and fertilizer and can do much to supplement the more conventional sources. The World Bank estimated in 1981 that one-third of China's fertilizer requirements were provided by nightsoil, see Brown, 1987.

### Balanced Third World Development

Balanced Third World development must be started and accomplished in the rural villages because that is where 80 percent of the Third World population is located. Furthermore, the food production in the Third World depends upon the people in these rural villages.

All sectors must move forward together. No single sector (e.g. irrigation or health or water supply) can move forward very far by itself. The sectors which are important for development include:

- Ir = Irrigation
- Ag = Agriculture
- WS = Water Supply
- H = Health
- En = Energy
- Ed = Education
- In = Industry
- C = Communications
- F = Forestry
- BF = Banking and Finance
- Ev = Environmental
- NR = Natural Resources



In equation from, these can be expressed as:

$$\text{Dev} = f(\text{Ir}, \text{Ag}, \text{WS}, \text{H}, \text{En}, \text{Ed}, \text{In}, \text{C}, \text{F}, \text{BF}, \text{Ev}, \text{NR})$$

If the influence of each sector is simply additive, then

$$\text{Dev} = f(\text{Ir} + \text{Ag} + \text{WS} + \text{H} + \text{En} + \text{Ed} + \text{In} + \text{C} + \text{F} + \text{BF} + \text{Ev} + \text{NR})$$

But some sectors have a greater impact on development than others and some sectors interact with others to cause an increase in development which is greater than the simple sum of the individual sectors. For example, education and health have an enormous impact on the other sectors (e.g. agriculture and industry) which can progress only to a limited extent, without improved education and health. It was this balanced development of all sectors in the U.S. which made it possible for agriculture and industry to make such giant steps forward in the last half century. Hence, irrigation cannot be considered in isolation from the other sectors.

Belasco, 1987, has shown very clearly that in the health sector the villagers can be taught the importance of clean water, and they can parrot back what they have been told, but they will not practice the use of clean water because they do not really understand, and it frequently goes against tradition. The education sector must be developed more to give an understanding of why.

### **Tandem Use of Hard Technology and Soft Technology**

Development of irrigation and the other sectors in the rural areas of the Third World countries depends upon a tandem use of both hard technology and soft technology, and these technologies must be appropriate to the local situation. The following definitions are needed at this point, see Faulkner and Albertson, 1986:

**Appropriate technology** is defined as the skills, knowledge and procedures for making, using and doing useful things, while making optimum use of human, natural (renewable), and person-made resources in the village — with optimum determined on a

village-specific basis by the villagers themselves.

Appropriate **hard technology** relates to engineering techniques physical structures and machinery, that meet a need defined by the village, and utilize the materials at hand or readily and inexpensively available. This technology can be built, operated and maintained by the local people with very limited outside assistance (e.g. technical, material or financial).

Appropriate **soft technology** deals with the social structures, human interactive processes, and motivational techniques. It is the structure and process for social participation and action by individuals and groups in analyzing situations, making choices and engaging in choice-implementing behaviors that bring about change.

Soft technology is imperative as a starting point for implementing the hard technology. More specifically, the people of a rural village in the Third World are the human resource with a need for development (improvement of their situation). These people must use the soft technology to create psychological and social infrastructures in order to employ social, cultural, political, economic and legal processes. Using these processes, the people can create and utilize institutional and organizational resources in order to have vehicles for taking advantage of hard technology which is (or can be made) available to conserve and harness the natural (and renewable) resources. This is done to create and expand the physical, economic, agricultural and industrial infrastructure. This can, in turn, be used to produce social and material goods, such as health care, education, information and consumer goods, for the benefit of the people. With each cycle, the improved condition and situation of the people makes it possible for them to be even more effective and successful on the next cycle.

In all of this the values, attitudes, opportunities and outcomes influence motivation and behaviors that give

speed and direction to the development process.

It can be seen that irrigation is only a part (an extremely important part) of the total picture of development. Water, land and people can be added to increase the amount of irrigated land. But in order to improve the yields per hectare it is necessary to have a balanced development.

Not only is the tandem use of hard and soft technology important, but it is also essential for the villagers to be involved every step of the way. This is explained in detail by Faulkner and Albertson, 1986; by Lowdermilk, 1986; and by Leeper, 1986. Lowdermilk gives a detailed analysis of the need for farmer involvement each step in the development and operation of an irrigation system, and Leeper shows the importance of farmer involvement in a Navajo irrigation project.

In brief, the villagers must be involved first in identifying their problems and then clearly defining the nature and scope of the problems. Then they must be involved in selecting each problem to be solved and then planning a solution to the problem. Next, the villagers must participate in a significant way carrying out the plan for the solution (the project). Finally, the villagers must be involved to the maximum extent possible in the operation and maintenance of the solution and any infrastructure involved. Only in this way will the villagers understand the entire process and how it is carried out. Furthermore, the villagers will identify with the project (the solution) and each component of it, and in turn they will feel a responsibility to keep all parts of the project functioning smoothly and in a timely manner. In a recent research project by Hamid Ahmed, he found the Institute of Cultural Affairs to be using this technique more successfully for Third World village development than any other non-governmental organization (NGO).

### **Summary and Conclusions**

1. The world is facing an alarming situation today with enough worldwide grain reserves to last only 54 days.

2. These reserves will be stretched over a longer period of time by raising the price, which will have a serious negative impact on the people of the Third World.

3. Irrigation must play a major role in increasing food production.

4. Very little new land can be made available for irrigation in the Third World. Therefore, existing irrigated land must be farmed more efficiently to increase yields per acre.

5. Organic agriculture will become a requirement in the foreseeable future.

6. Sewage wastes can become an important source of water and fertilizer for irrigation near human settlements.

7. More efficient farming and increased yields depend upon more balanced development so that the farmer has a better education and support system in which to operate.

8. Successful developmental projects and programs in the Third World depends primarily upon farmer involvement and leadership every step of the way – from inception, definition and planning to construction, operation and maintenance.

**Table 1. The Changing Pattern of World Grain Trade, 1955-88<sup>1</sup>**

Region	1950	1960	1970	1980	1988 <sup>2</sup>
North America	+23	+39	+56	+131	+119
Latin America	+1	0	+4	-10	-11
Western Europe	-22	-25	-30	-16	+22
E. Eur/Soviet Union	0	0	0	-46	-27
Africa	0	-2	-5	-15	-28
Asia	-6	-17	-37	-63	-89
Australia/New Zeal	+3	+6	+12	+19	+14

<sup>1</sup>Plus sign indicates net exports; minus sign, net imports. <sup>2</sup>Preliminary.

Sources U.N. Food and Agriculture Organization. *Production Yearbook* (Rome: various years); U.S. Department of Agriculture. Foreign Agricultural Service. *World Rice Reference Tables* and *World Wheat and Coarse Grains Reference Tables* (unpublished printouts). Washington, D.C. June 1988. From Worldwatch Institute.

**Table 2. World Grain Production, Use, and Carryover Stocks, 1961-88**

Year	Production	Consumption	Carryover Stocks	
			Quantity	Consumption Equivalent
		(million metric tons)		(days)
1961	813	835	185	81
1965	917	952	159	61
1970	1,096	1,130	198	64
1971	1,194	1,169	223	70
1972	1,155	1,192	186	57
1973	1,271	1,259	198	57
1974	1,219	1,213	203	61
1975	1,250	1,229	221	66
1976	1,363	1,303	281	79
1977	1,337	1,338	279	76
1978	1,467	1,418	328	84
1979	1,428	1,440	315	80
1980	1,447	1,475	286	71
1981	1,497	1,476	307	76
1982	1,548	1,500	355	86
1983	1,485	1,537	303	72
1984	1,645	1,585	363	84
1985	1,661	1,594	430	98
1986	1,682	1,653	459	101
1987	1,597	1,653	402	89
1988	1,521	1,673	250	54

Sources: 1961-87. U.S. Department of Agriculture, Foreign Agricultural Service. *World Grain Situation and Outlook*. Washington, D.C. July 1988. From Worldwatch Institute.

## **Irrigation Systems Conference to be Held in Belgium**

The Center For Irrigation Engineering and the Laboratory of Land Management at Katholieke Universiteit, Leuven, Belgium, are organizing the September 14-17, 1992, **Conference on Advances in Planning, Design and Management of Irrigation Systems as Related to Sustainable Land Use**. The objectives of the conference are: to assess the current state-of-the-art in irrigation development planning, irrigation design, irrigation system monitoring, project evaluation and practices to promote sustainability in irrigated land use systems; to enhance interdisciplinary cooperation and information exchange; and to provide directions for further technological and methodological research toward sustainable irrigated agriculture. A wide representation of research and extension institutions, universities, and various agencies involved in irrigation development planning and management will be called upon for this meeting. For information, contact: Mrs. G. Camps, Kardinaal Mercierlaan 92, B-3001 Leuven (Heverlee), Belgium. Telephone: 32 16 220931 Extension 1550 or Fax: 32 16 205032.□

## **Delft Institute Announces Water Resources Courses**

The International Institute for Hydraulic and Environmental Engineering in Delft, The Netherlands, has announced several water resources related courses for 1992 and 1993. Regular postgraduate courses include:

### **Hydraulic Engineering**

Specialization in river engineering; coastal, estuarial and harbor engineering; land and water development; hydroinformatics.

### **Hydrology in Water Resources Development**

Study of hydrology in water resources development with specialization in surface water hydrology; groundwater hydrology; water resources management.

### **Sanitary Engineering**

Specializations in urban water and waste water engineering, low-cost water supply and sanitation and anaerobic waste water treatment.

### **Water Quality Management**

Providing interdisciplinary training for professionals engaged in monitoring, maintaining and modifying the quality of surface and groundwater within a river basin in relation to the different purposes for which the water is used.

### **Environmental Science and Technology**

Dealing with practical environmental problems in industrialized as well as in developing countries.

Among the short courses are:

### **International Course on Applied Ecology and its Role in Managing the Environment**

This course, offered June 23-August 20, 1992, provides training in environmental resource management with emphasis in ecosystem analysis and applicability of ecological principles in environmental management. The course aims at the integration of scientific research, planning and the implementation of plans for environmental management.

### **International Course on Low-Cost Water Supply and Sanitation**

The purpose of this course, offered June 23-August 20, 1992, is to present state-of-the-art knowledge about the various technologies and approaches in the field of low-cost water supply and sanitation and to provide training in how to apply this knowledge in practical situations.

### **International Course on Water Quality Management for Decision makers**

This course, offered June 23-August 20, 1992, provides training in the aspects of water quality management that are common ground for decision makers and water experts, and of direct importance to both. This shared knowledge and insight makes them better able to function in practical situations.

### **International Course on Anaerobic Waste Water Treatment**

The purpose of the course, offered June 23-August 5, 1992, is to provide state-of-the-art knowledge about anaerobic waste treatment to engineers and scientists from both industrialized and developing countries. This enables them to determine the feasibility of these technologies in specific situations and to guide the entire process from the selection of technologies to the design and construction of an installation, and finally to its operation and maintenance.

The International Institute for Hydraulic and Environmental Engineering also offers M.S. and PhD programs, as well as a number of other specialized short courses, for civil and environmental engineers. A schedule of the courses organized for 1992 is available from the USCID Denver office.

Applications and requests for additional information and brochures should be sent to the Registrar of the International Institute for Hydraulic Engineering, P.O. Box 3015, 2601 DA Delft, The Netherlands, telephone: 31-15-785297, fax: 31-15-122921.□



## **Recruit a New Member!**

**USCID now has six membership categories:**

- **Individual**
- **Library**
- **Institutional**
- **Corporate**
- **Sponsoring Organization**
- **Sustaining Organization**

**A Membership Application Form/Fact Sheet is enclosed with this Newsletter.**

**Please give the Application to a colleague and encourage them to join, or encourage your organization to consider a Library, Institutional or Corporate membership.**

**Contact the USCID office for additional Application Forms  
or for information on the Organization memberships:**

**USCID  
1616 Seventeenth Street, Suite 483  
Denver, CO 80202  
Telephone: 303-628-5430  
Fax: 303-628-5431**



## ICID Meets in Beijing

A large delegation from USCID attended the 42nd Meeting of the ICID International Executive Council (IEC), held in Beijing, China, last April. In addition to participating in meetings of the ICID committees and working groups, and a technical session, highlights of the trip to China included a visit to the Great Wall of China, the study tours and an opportunity to meet the Premier of China, Li Ping.

USCID Members are active on most of the ICID working groups and committees. Among the U.S. delegation attending the Beijing meeting were Marvin Jensen, President Honoraire, and Doris Jensen; Marcel Bitoun, Committee for Technical Activities; Bill Klostermeyer, Committee on Research and Future Developments, and Shirley Klostermeyer; Israel Broner, representing Herb Greydanus on the Working Group on Crops and Water Use and Allan Humpherys on the Working Group on Mechanized Irrigation; Dale Bucks, Chairman of the Working Group on Micro Irrigation; Sam Guy, Chairman of the Working Group on Construction, Rehabilitation and Modernization of Irrigation Projects, and Marie Glass Guy; Ron Johnston, Working Group on Operation, Maintenance and Management of Irrigation and Drainage

Projects; Joe Summers, Secretary of the Working Group on Drainage, and Rose Summers; Darell Zimbelman, Vice-Chairman of the Working Group on Environmental Impacts of Irrigation, Drainage and Flood Control Projects, and Suzanne Zimbelman; Cliff Barrett, Vice President Honoraire, and Lee Barrett; Walter Schulz, Vice President Honoraire and Honoraire Member, Permanent Finance Committee; Wally Ochs, representing the World Bank; Swayne Scott, representing FAO, and Frankie Scott; Larry Stephens, Vice President and member of the Permanent Finance Committee; Vilma Horinkova; Mohan Junna; Darrell Fontane; Rick and Anamarie Gold; and Ralph and Marlene Ross.

Gold, Junna and Broner were authors of papers for the Special Technical Session on Planning, Operation and Management of Irrigation Systems for Water and Energy Conservation.

Among USCID Members receiving new committee and working group appointments by the IEC were Bill Klostermeyer, Committee for Technical Activities; Mike Stansbury, Working Group on History of Irrigation, Drainage and Flood Control; Gordon Kruse, Chairman of the Work Team on Dictionary; and Rick Allen, Working Group on Crops and Water Use.

Among other decisions taken by the IEC were: election of Vice Presidents Jose Ortiz, Spain, Bart Schultz, The Netherlands, and M.S. Reddy, India; selection of Italy to host the 46th IEC meeting in 1996; and adoption of financial reports, 1991 budget and Constitution and By-law changes. The Council also heard reports from the committees and working groups, summarizing current ICID activities, and reviewed reports from National Committees for future ICID meetings, including the 43rd IEC Meeting and 16th European Regional Conference in Budapest, Hungary, June 21 to 27, 1992; the 3rd Pan-American Regional Conference in Mazatlan, Mexico, November 9 to 11, 1992; the 44th IEC Meeting and 15th Congress in The Hague, The Netherlands, August 30 to September 11, 1993; and the 45th IEC Meeting and 17th European Regional Conference in Varna, Bulgaria, May 16 to 24, 1994.

The Beijing IEC Meeting was an enriching experience, both professionally and culturally, for all who attended. The Budapest Meeting next year should also be outstanding — contact the USCID Denver Office if you would like to be involved. □



### Wilson Elected (Continued)

Greydanus, Sammie D. Guy, Thomas E. Levy, Jerry Schaack and Michael R. Stansbury. Wilson and Stansbury began their second three-year terms on the Board this year, while Greydanus began his first term.

In other Annual Meeting business, the Board reviewed the 1990 Financial Statement, approved a Budget for 1991, adopted two new membership categories, reviewed ICID activities and heard reports of the USCID committees. The 1990 Financial Report and 1991 Budget may be found in this Newsletter. Copies of the Minutes of the 1991 Annual Meeting are available to members upon request — write or call the USCID office. □

### Indian Agency Offers Sedimentation Course

The Central Water Commission, Government of India, has announced a regional training course on **Reservoir Sedimentation and Control**, December 9-22, 1991, at Roorkee, India. Erosion from catchments, sediment transport, sediment flushing from reservoirs, reservoir surveys, impact of reservoirs on river regimes, and a modeling of the process of reservoir sedimentation, are

features of the course. The course was planned for the benefit of practicing engineers and other research workers associated with water resources projects. For details, contact: K. G. Ranga Raju, Professor of Civil Engineering, University of Roorkee, Roorkee 247667, India. □

### Colorado Water Engineering and Management Conference

The Civil Engineering Department and the Colorado Water Resources Research Institute at Colorado State University, the Colorado Office of the State Engineer and the American Water Resources Association (AWRA) Colorado Section, seek papers for the **1992 Colorado Water Engineering and Management Conference** including the AWRA Symposium and Annual Meeting. The Conference/Symposium will focus on two main problems of water management: complexity and conflict. For details about the conference, contact: Janet Lee Montera, Colorado State University, Fort Collins, Colorado, 80523. Telephone: 303-491-7425 Fax: 303-491-7727. □

### Sustainable Irrigation Conference in Egypt

Sustainable development of agriculture in the 1990's, with particular reference to Egypt in the future, is the focus of an upcoming conference in Alexandria, Egypt, May 15-19, 1992. Themes addressing sustainability will include environmental, economic, cultural, social and political aspects. Other topics include natural resources development, adaptation of technology, human resources development, and world economy and trade. Registration for the conference is \$500 and should reach the secretariat as soon as possible. Contact: M. A. Faris, Secretariat, Alexandria International Conference, Macdonald Campus, c/o CEMARP Office 21, 111 Lakeshore Road, P.O. Box 185, Ste-Anne-de-Bellevue, Quebec, Canada H9X 1C0. Telephone: 514-398-7772. □



## Utah State Courses:

The International Irrigation Center in Logan, Utah, is offering the following courses:

### Computer-Assisted Irrigation System Management

(49-week course)

January 5-December 12, 1992

Arizona, California, Colorado, Idaho, Utah

### Applied Microcomputer Use in Irrigation and Drainage

(6-week course)

January 5-February 15, 1992

Logan, Utah

### Waterlogging, Drainage, and Salinity Control

(6-week course)

March 22-May 2, 1992

Arizona, California, Colorado, Utah

### On-Farm Irrigation Design and Evaluation

(6 weeks)

May 3-June 13, 1992

Colorado, Utah

### On-Farm Irrigation Scheduling

(3 weeks)

June 14-July 4, 1992

Logan, Utah

### Workshop on Policy, Planning and Strategies for Irrigated Agriculture Applied Remote Sensing in Agriculture

(4 weeks)

1992 - Available upon request

Utah

### On-Farm Water Management

(6 weeks)

July 12-August 22, 1992

Colorado, Utah

### Farmer Participation and Irrigation Organization

(3 weeks)

August 23-September 12, 1992

Utah

For additional information regarding these courses, write:

Admissions Committee

International Irrigation Center

Utah State University

Logan, UT 84322

or telephone: 801-750-2800,

fax: 801-750-1248.□

## USCID FINANCIAL STATEMENT — 1990

For the Twelve Months Ended December 31, 1990

### Revenues:

Membership Dues:	Individual	\$14,305
	Library	.765
	Institutional	1,800
	Corporate	4,550
Interest Income		1,928
ICID Publications		.193
ICID Bulletin Cards and Ads		2,313
ICID Bulletin Subscriptions		2,260
USCID Publications — Advertising		.200
USCID Publications — Sales		4,252
1989 Toxics Meeting		6,440
13th Congress Reprints/Page Charges		2,297
1989 Regional Meeting — Boise		.343
1989 Regional Meeting — St. Louis		.480
<b>Total Operating Revenues:</b>		<b>\$42,126</b>
Other Revenue: Loan Payment — AWF		\$3,000
<b>Total Operating Funds:</b>		<b>\$45,126</b>

### Direct Costs:

ICID Publications	\$109
ICID Bulletin Cards and Ads	.0
ICID Bulletin	.0
USCID Publications	.423
1989 Toxics Meeting	4,560
1989 Pan Am Conference	10
1989 Regional Meeting — Boise	2,033
1989 Regional Meeting — St. Louis	2,033
1986 Regional Meetings	2,029
1987 Regional Meetings	.262
13th Congress Reprints/Page Charges	.0
<b>Total Direct Costs:</b>	<b>\$11,459</b>

### Overhead Expenses:

Accounting	\$350
Communications	.368
Contractors	1,995
ICID Annual Contribution	8,760
Dues and Subscriptions	.40
Equipment	2,223
Office Supplies	.358
Postage and Mailing	3,352
Printing	3,567
Public Information	.0
Travel and Meetings	2,499
Miscellaneous Expense	.100
<b>Total Overhead Expenses:</b>	<b>\$23,612</b>

**Total Direct Costs and Overhead Expenses:** \$35,071

**Net Revenues Over Costs and Expenses:** \$10,055

## USCID FINANCIAL STATEMENT – 1990 (Continued)

Balance Sheet – December 31, 1990

### Assets:

#### Current assets:

Cash in Checking . . . . .	\$9,439.29
Summers Engineering Endowment Certificates of Deposit . . . . .	6,750.10
Other Cash Investments Savings Account . . . . .	317.36
Certificates of Deposit . . . . .	20,700.00
Prepaid Expenses 1991 Regional Meeting . . . . .	399.41

**Total Current Assets:** . . . . . \$37,606.16

**Total Assets:** . . . . . \$37,606.16

### Liabilities and Capital:

#### Current liabilities:

Due to AWF . . . . .	\$50.00
FICA payable . . . . .	0.00
FWT payable . . . . .	0.00
CWT payable . . . . .	0.00

#### Deferred revenues

Dues – Library . . . . .	0.00
Dues – Institution . . . . .	0.00
Dues – Corporate . . . . .	0.00

**Total Current Liabilities:** . . . . . \$50.00

**Total Liabilities:** . . . . . \$50.00

#### Capital:

Life Membership Fund Balance	
Current Year Revenues . . . . .	0.00
Balance at Beginning of Year . . . . .	21,300.00
Summers Engineer Fund Balance	
Current Contributions . . . . .	463.50
Balance at Beginning of Year . . . . .	6,510.00
General Fund Balance . . . . .	2,228.14
Net Income: . . . . .	7,054.52

**Total Capital:** . . . . . \$37,556.16

**Total Liabilities and Capital:** . . . . . \$37,606.16

I have examined the Income Statement for the Twelve Months ended December 31, 1990, and the Balance Sheet through December 31, 1990, for the U.S. Committee on Irrigation and Drainage and certify that the documents are correct and accurate.

Signed/A. Fred Stoll, Accountant

I have also examined the 1990 financial documents for the U.S. Committee on Irrigation and Drainage and find them to be correct and accurate.

Signed/E. Gordon Kruse, Secretary

## USCID Forms Working Committee on History of Irrigation

USCID has recently formed a Working Group to prepare a document on the History of Irrigation in the United States. Though the document will eventually become part of a much larger collection of works being developed by ICID, the initial effort involves preparation of a comprehensive report covering development of irrigation throughout the United States. The Committee's first meeting will take place during the 12th Technical Conference, November 13, 1991, in San Francisco, California. Drafting a mission statement for the Committee, preparation of a preliminary report outline and assignments for elements of the research will occur at that time. Mike Stansbury, Committee chairman, invites members interested in becoming part of this Committee to contact him at 206-453-1523. □

### Upcoming Meetings

The ASCE 1992 National Conference on Water Resources Planning and Management, a component of Water Forum 1992, is set for August 3-5, 1992, in Baltimore, Maryland. Sponsored by the Urban Water Resources Research Council and Water Resources Policy Management Divisions, special emphasis is being given to national and international contributions that discuss either newly-emerging problem areas, new methodology, or suggested new directions for water resources research.

The International Conference on Protection and Development of the Nile and other Major Rivers will be held in Cairo, Egypt, February 3-5, 1992. The conference is sponsored by the Canadian International Development Agency. Contact: Mohammed El Moattassem, Director, High Aswan Dam Side Effects Research Institute Water, Research Center Building, Qanater, Egypt. Telephone: 202 954163, Fax: 202 778298. □

## 1991 USCID Budget

### Income

Annual Dues:	Individual and Senior	\$23,400
	Library	950
	Institutional	2,400
	Corporate	6,750
Organizational Member Dues:	Sponsoring	30,000
	Sustaining	5,000
Interest Income — Life Member CD's		1,500
Interest Income — Endowment Fund		500
ICID Publication Sales		200
ICID Bulletin Cards and Ads		2,500
ICID Bulletin Subscriptions		2,500
USCID Publications: Ads and Sales		4,200
Congress Reprints and Page Charges		2,000
1991 Regional Meeting		5,200
12th Technical Conference — Registration and Exhibits		22,400
<b>Total Income:</b>		<b>\$109,500</b>

### Expenditures

#### Accounts Payable:

ICID	\$18,950
Stephens Management Services	5,000
Less use of carry-over cash	9,400
Net	\$14,550

#### Direct Costs:

ICID Publications	\$200
ICID Bulletins	3,600
ICID Bulletin Cards and Ads	2,500
USCID Publication Order Fulfillment	1,000
USCID Publications — 1991 Regional Meeting	2,500
14th Congress Reprints and Page Charges	2,000
1991 Regional Meeting	4,000
12th Technical Conference	12,000
Scholarship	1,000
<b>Total Direct Costs:</b>	<b>\$28,800</b>

#### Overhead Expenses:

Accounting and Audit	\$800
Communications	1,500
Contractors — Stephens Mgt. and staff	28,000
Design	885
ICID Annual Contribution	9,115
Dues and Subscriptions	100
Equipment	1,000
Office Rent	1,500
Insurance	300
Legal	100
Office Supplies	600
Postage and Mailing	6,000
Printing	8,000
Travel and Meetings	4,250
Miscellaneous and Contingency	4,000
<b>Total Overhead:</b>	<b>\$66,150</b>

**Total Direct and Overhead: \$109,500**

## Loan Reports

The following publications are available on loan from USCID, 1616 Seventeenth Street, Suite 483, Denver, Colorado 80202, telephone: 303-628-5430.

*Annual Review 1989-90*, Coachella Valley Water District.

*CH2M Hill Annual Report*, Winter 1990. Report, December 1990 and Summer 1991, CH2M Hill, Denver, Colorado.

*Charter on Ground-Water Management*, Economic Commission for Europe, United Nations.

*Colorado Water*, June 1990; January, May, 1991. Colorado Water Research Institute, Colorado State University.

*Environment Bulletin*, September, October, December 1990; February, 1991. Coachella Valley Water District.

*FASE Reports*, Winter/Spring 1991. Foundation for Advancements in Science and Education.

*General Publications Catalog*, Spring 1990. International Irrigation Management Institute.

*Institutional Framework of Small Community Water Supply Systems in the United States*, 1991. The World Bank.

*The IDB*, Inter-American Development Bank, September and October, 1991.

*International Irrigation Management Institute Annual Report*, 1989. Colombo, Sri Lanka.

*Irrigation and Power Journal*, October, April and July 1990; April 1991. Central Board of Irrigation and Power, New Delhi.

*Journal of Hydraulic Engineering*, No. 1-12 1990; No. 4-6 1991. Chinese Hydraulic Engineering Society, Beijing (in Chinese).

*Journal of Irrigation Engineering and Rural Planning*, No. 18 February 1990. Japanese Society of Irrigation, Drainage and Reclamation Engineering.

*The Erosion Map of New Zealand*, Streamland 68, Division of Water Sciences, New Zealand.

*New Zealand Land Resource Inventory*, Streamland 69, Division of Water Sciences, New Zealand.



*ODI-IIMI Irrigation Management Network Paper*, December 1990. Sponsored by Overseas Development Administration.

*ODU Bulletin*, Irrigation System Performance, April 1990, No. 18; Irrigation Management and Microcomputers, October 1990; and Siltation Problems in the Gezira Irrigation Scheme, Sudan, January 1991. Overseas Development Unit of Hydraulics Research, Wallingford, United Kingdom.

*Resource*, Spring and Summer 1991. Resource Management International.

*Resource Law Notes*, December 1990. Natural Resources Law Center, University of Colorado, Boulder.

*Rural Development Concept of Sustainable Use of Natural Resources*, Royal Irrigation Department, Thailand.

*The World Bank and the Environment*, 1st Annual Report, 1990.

*Vision – Groundwater: Unlocking Resources*, Spring 1991. Boyle Engineering Corporation.

*Water Act of August 1, 1985*, Published 1990. Spanish National Committee.

*Water Conservation News*, June and December 1990; April and October 1991. California Department of Water Resources.

*Water International*, June and December 1990; March and June 1991. Official Journal of the International Water Resources Association.

*Water Resources Development in Louisiana 1989*. U.S. Army Corps of Engineers.

*Water Resources Development in Louisiana 1991*. U.S. Army Corps of Engineers.

*Western Water*, May, June, July and August 1990; January, February, March and April 1991. Water Education Foundation.

*World Water*, July/August 1991. Telford House, London, United Kingdom.

*World Water Resources Survey Large Dams: The Environmental Tide Turns*, January and February 1990. Departmental of Scientific and Industrial Research. □

## Ochs, Heermann and Skaggs ASAE Fellows

Three USCID members, **Dale F. Heermann**, **Walter J. Ochs** and **R. Wayne Skaggs**, have been elected Fellows of the American Society of Agricultural Engineers (ASAE). Skaggs received his award in 1990 during the June summer meeting. Heermann and Ochs were honored at the Society's summer meeting June of this year.



Heermann, Director for the Northern Plains Area, USDA-ARS, is a recognized leader in the field of irrigation. He was instrumental in establishing the Irrigation Management Committee and played a major role in three ASAE-sponsored irrigation symposiums.



Ochs, Senior Drainage Engineering Specialist for the World Bank, was recognized for his work in the field of drainage materials — standards, specifications, and drainage practice — and for his leadership within the ASAE Soil and Water Division and Standards Development Committee.



Skaggs received his award at the Society's summer meeting, June 24-27, 1990, in Columbus, Ohio. He is an international leader in the field of agricultural water management, particularly in the areas of drainage, subirrigation, and water table control. He is well-known for his development of DRAINMOD, a computer simulation model for tailoring the design of water management systems to specific soil, site, crop, and climatological conditions. He has won numerous ASAE awards and earned

the Society's Paper Award for outstanding publications five times.

Fellows are elected annually for their unusual professional distinction and extraordinary qualifications. A minimum of 20 years of active practice in engineering or teaching engineering, with demonstrated distinction in performance for at least 5 years, is required for nomination. This is the highest award an ASAE member can receive. Only about two percent of ASAE's membership achieve this high distinction. □

### Necrology

**Jack N. Christopher** passed away on September 8, 1990. He was Chief of the Groundwater Branch of the Bureau of Reclamation in Denver, Colorado.

**Oliver H. Folsom** passed away on October 12, 1990, following surgery. He is survived by his wife, Dorothy.

**J. David Lytle** died on July 30, 1990. He was retired from Corps of Engineers in the St. Louis District.

**Charles B. Maierhofer**, retired head of the Bureau of Reclamation's drainage and groundwater office, died April 11, 1991, at his home. A University of Texas Graduate, he began with Reclamation in 1940, then worked from 1972 to 1980 as a consultant after retirement. Maierhofer received a Distinguished Service Award from the Secretary of the Interior in 1972 and ASCE's Royce J. Tipton Award in 1976.

**Arthur F. Pillsbury** was 87 at the time of his death on April 12, 1991. Prior to his retirement in 1972, he was Director of the Water Resources Center for the University of California — Los Angeles. He received the 1977 ASCE Royce J. Tipton Award.

**A. R. Robinson** died on September 19, 1990. He is survived by his wife, Martha.

**Frank J. Trelease** died on July 21, 1990, in Cheyenne, Wyoming, after a long illness.

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## News of Members

**Virgil L. Backlund** was transferred to a new position as Regional Drainage Engineer at West Technical Center located in Portland, Oregon.

**Bishay G. Bishay and Gene C. Vittetoe** have established Vittetoe, Bishay & Associates, Inc. The firm provides services needed for all stages of a project cycle and has extensive background in the areas of irrigation, land drainage, flood control, soil conservation, land and water development, watershed management and hydrology under arid, semi-arid, temperate and tropical climates.

**Allen R. Dedrick**, Director of the U.S. Water Conservation Laboratory in Phoenix, was named the 1989 Irrigation Association Man of the Year, recognizing his leadership in promoting irrigation industry professionalism and development of national and international standards.

**John R. Eckhardt** has been appointed Colorado Assistant State Engineer for the Technical Services Branch, where he will head the following groups: computer modeling, dam safety, water management and supply, hydrographics and geotechnology. Eckhardt recently completed requirements for a PhD degree in Civil Engineering at Colorado State University.

**Ronald L. Elliott** has returned to his research and teaching duties in Agricultural Engineering at Oklahoma State University, following a one-year sabbatical leave with the Bureau of Reclamation in Denver. He was assigned to develop software relating to the estimating of crop evapo-transpiration. He also served as the chairman of the publication committee for the ASAE Third National Irrigation Symposium during October 1990.

**Andrew W. Farrar** retired as Project Superintendent for the Bureau of Reclamation's Tracy, California, office and became General Manager of the Banta-Carbona Irrigation District in Tracy.

**David W. Fonken** has completed a 15-month assignment in Dhaka,

Bangladesh, working with two master planning organizations for **Harza Engineering Company**.

**Lyman R. Flook, Jr.**, is now associated with the Lakewood, Colorado, consulting firm TriConsultants, Inc. His former firm, McCall-Ellingson and Morrill, Inc., was recently acquired by Triconsultants.

**Harza Engineering Company** has announced that James H. Gwise is heading a new subsidiary — Harza Northwest, Inc. Hosey and Associates Engineering Company in Bellevue, Washington, was acquired by Harza and combined with Harza's Portland Regional Office to form Harza Northwest.

**Robert M. Hagan**, professor emeritus of the University of California, was elected President of the Water Education Foundation.

**Dale E. Henry** recently completed an M.S. in Irrigation and Agricultural Engineering from Utah State University and is now a Civil Engineer with the Bureau of Reclamation in Moses Lake, Washington.

**Ruth E. Johnston** has been appointed to Chair the Water Resources/Water Quality Committee for American Agri-Women.

**Pierre Y. Julien** received the American Society of Civil Engineers 1989 Stevens Award for his discussion on the field of hydraulics and sediment transport. The award was presented to him August 16, 1990, during the ASCE National Conference on Hydraulic Engineering held in New Orleans, Louisiana. An Assistant Professor at Colorado State University, he is currently on sabbatical leave in The Netherlands.

**Shahram Khosrowpanah**, University of Guam, is director of the Water and Energy Research Institute of the Western Pacific.

**John L. Merriam**, since retiring from teaching in 1978, has concentrated on establishing pilot projects in foreign countries that demonstrate the application of farmer-controlled, flexible delivery irrigation systems. One such system has been established in Sri Lanka while others are being

established in Pakistan, India and Egypt. The concept and technology have also been reviewed within the past year for incorporation into the national plans of Germany and England. Merriam attended the ICID Congress in Rio de Janeiro where two papers he co-authored on this subject were presented.

He and his wife have established the Merriam Endowment Fund for Irrigation and Water Management in the Agricultural Engineering Department at California Polytechnical State University. The Endowment Fund provides income for faculty travel, education and research, student scholarships, student projects and travel to conferences and short courses.

**David B. Kelley** recently spent time consulting in Peru. Kelley was involved with Peruvian asparagus growers for fresh market asparagus exporting. While in Peru he also spent a week with USAID on a feasibility study for asparagus and various other crops in the Chao and Viru Valleys near Trujillo, Peru.

**Nolan L. Pike** was named President of ATC Engineering Consultants, Inc. in March 1991. Pike has had extensive experience in Latin America and the Middle East. Before becoming President, he managed ECI's work on the prefeasibility study of the 100,000 hectare Puyango Tumbes Irrigation Project in Ecuador.

**John E. Priest**, formerly associated with ECI, has recently returned from an assignment in Indonesia for Harza Engineering Company.

**Stuart T. Pyle**, general manager of the Kern County Water Agency in Bakersfield, California, since 1973, is completing his first year as Senior Advisor for the Agency on a number of special projects, including facilities for the State Water Project and Agency operations in the Sacramento-San Joaquin Delta.

**J. Mohan Reddy**, University of Wyoming, was in India during the months of August 1990 and January 1991, delivering a series of lectures on invitation from the Department of Electronics and the National

Productivity council of the Government of India. Lecture topics included: canal automation, low-head drip irrigation, alternative energy sources for pumping irrigation water, and energy conservation in irrigated agriculture.

**Yvonne Reinink** has accepted a position as Senior Water Resources Analyst at the Salt River Project in Phoenix, Arizona.

**William A. Rettberg**, head of Harza Engineering Company's Denver office, has been elected President of the Consulting Engineers Council of Colorado.

**J. D. Rhoades** has been named Director of the U. S. Salinity Laboratory.

**Dwight P. Russell** was appointed Chief of the Suisun Marsh Planning Section at the California Department of Water Resources in Sacramento, California. In accepting this new job, Russell took on the responsibility to direct the implementation of the "Suisun Marsh Preservation Agreement".

**James C. Ringenoldus** completed a year as Harza Engineering Company's Chief of Party in Pakistan for the Irrigation Systems Management Project – Phase II in October. This USAID-financed project provides technical assistance to the Provincial Irrigation Departments of Pakistan for improving design for rehabilitation of canals, improving operation and maintenance, and improving construction equipment, management and maintenance.

**W. Martin Roche** was promoted to Construction and Maintenance Department Manager of the **Turlock Irrigation District** in Turlock, California.

**Karl J. Ruzicka**, managing director of Pacific Exports, reports the firm has opened an office in Prague, Czechoslovakia, to handle sales of irrigation products in Central and Eastern Europe. Design and installation of irrigation systems, negotiation of licensing and manufacturing agreements and market studies are offered by the Prague office. Ruzicka has been selling U.S. manufactured irrigation products since 1968.

**Adnan A. Saad** is now associated with Michael Baker, Jr., Inc., Alexandria, Virginia, as Senior Water Resources Manager after his return from a long international assignment in Saudi Arabia.

**James R. Sato** was elected Secretary-Treasurer of the Consulting Engineers Council of Colorado.

**Kenneth H. Soloman** of the Center for Irrigation Technology in Fresno, California, was named the Irrigation Association's 1990 Man of the Year. He has published more than 90 popular and scientific articles on irrigation system design and management.

**Anand P. Terway** has rejoined ECI as Project Manager on the South Lakbok and Lower Citandry Projects in Indonesia.

**John Tiedeman** of Woodland, California, was honored as USDA Soil Conservation Service Engineer of the Year in ceremonies held by the National Society of Professional Engineers in Washington, D.C. Tiedeman's award was based on water conservation and water quality work in Northern California. USDA had chosen him as one of thirty-four engineers selected nationally for outstanding contributions. Beginning in June, 1991, he accepted a position in the Imperial Valley of California for SCS.

**Darrell W. Webber**, Assistant Commissioner of the Bureau of Reclamation, recently completed a two-year term as President of the United States Committee on Large Dams.

**Darell D. Zimbelman** was appointed to serve a five-year term on ASCE's managerial group, established to manage the technical activities of the Society. He will provide liaison with the Executive Committee of the Water Resources Planning and Management Division, the National Water Policy Committee, and the Urban Water Resources Research Council. He also completed a month-long assignment for USAID as part of a 3-member team that performed an assessment of the planning studies and model component of the Irrigation Management Systems Project. □

## Hungary Site for 1992 IEC Meeting

Budapest is the site for the **43rd ICID International Executive Council Meeting and the 16th European Regional Conference**, June 21-27, 1992. Topics for the Conference include strategies for development of a common ecological system within a global framework and rational utilization of the natural resources, with subtopics: drought in Europe; ecological, technological, and economical/social impacts on agricultural water management; and methods for decision-making and applications. Contact USCID for information. □

## IIMI Publications

IIMI has a new Working Paper series intended to stimulate discussion and to make the results of research available as soon as possible. One research thrust is based on the hypothesis that an unreliable supply in the primary canal negates the efforts of irrigators to achieve productive irrigation. Operational practices are often conditioned by the design features of the structures for water level control on the main canal and discharge control at their off takes. Research on the impact of a design feature cannot easily be carried out in the field, and has to depend on mathematical modelling. Those interested in the methodology and initial results should request the following publications from IIMI:

*Mathematical modelling of irrigation canal systems: International Irrigation Management Institute Working Papers No. 9*, by Daniel Berthery, Hilmy Sally and Jayantha Arumugam, and *Calibration of the Kirindi Oya RBMC mathematical flow simulation model: Description of the Field measurement campaign and preliminary results, Working Paper No. 10*, by Hilmy Sally, Daniel Berthery, Frederic Certain and Andre Durbec.

For a complete list of publications available and price list, write to: IIMI, P.O. Box 2075, 52 New Parliament Rd., Rajagiriya via, Colombo, Sri Lanka, 94-1-565601. □



## New Publications Available

*Land Drainage in Egypt.* Twelve years of collaboration between Egyptian and Dutch engineers and scientists have produced a comprehensive study of Land Drainage Management and Salinity Control in Egypt. Scientific and managerial practices are the main focus of the book. It is fully illustrated with tables, graphs and maps and contains the following chapters: History of Land Drainage in Egypt; Constraints in Drainage Conditions; Planning and Implementation of Drainage Projects; Design Criteria; Improvements in Drainage Technology; Improvements in the Execution of Drainage Projects; Drainage Water Re-use and Development and Application of Mathematical Models. The price is \$35; orders to: Drainage Research Institute, Water Research Centre, P.O. Box 13621/5, Delta Barrages, Cairo, Egypt.

*Instream Flow Protection in the West,* edited by Lawrence J. MacDonnell, Teresa A. Rice and Steven J. Shupe. Western water law has been revolutionized during the past 20 years by the changes made to provide some kinds of protection of nonconsumptive, instream uses and values of water. These changes are summarized and discussed in this book. Part I contains seven chapters which provide discussions of major policies and issues in the instream flow area. Part II includes 14 chapters on the instream flow laws and program of the western states. Orders to: the Natural Resources Law Center for \$20. For a list of publications available, write to: Natural Resources Law Center, University of Colorado School of Law, Campus Box 401, Boulder, Colorado 80309.

*The Influence of Wind on Sprinkler Irrigation, Annotated Bibliography,* compiled by the members of the Working Group on Mechanized Irrigation of the ICID Committee on Practices, Allan S. Humpherys, Chairman. A limited supply is available from the USCID office in Denver at no cost.

In association with the ICID Working Group on Environmental Impacts of Irrigation, Drainage and Flood Control Projects, a report titled "*Environmental impacts of irrigation, drainage and flood control projects: Analysis of replies to the ICID Questionnaire*" has been published by T. E. Brabben of Hydraulics Research, Wallingford, Great Britain.

*Proceedings of the 4th International Workshop on Land Drainage,* February 1990, Cairo, Egypt, edited by B. LeSaffre. Available from CEMAGREF, Communication and Information Directorate, B. P. 22, 92162 Antony, France. Price \$40.

*Sprinkle and Trickle Irrigation,* written by USCID Life Member Jack Keller and co-author Ron D. Bliesner, is a reference on irrigation system design principles and techniques. Complete design strategies for set sprinkler, traveling sprinkler, center-pivot, linear-moving, and trickle (drip), micro-spray, and line-source systems are offered. The publication is listed as a reference for irrigation and agricultural engineers, systems designers, and growers and students involved in irrigation design. Price is \$79.95. To order, call: 1-800-926-2665.

*Visions of the Future,* proceedings from the Third National Irrigation Symposium, is an ASAE and Irrigation Association publication priced at \$59.00 per copy (ASAE member copies are \$40.00). Irrigation professionals offer their experience related to current practices while other experts explore their visions of the future in irrigation research and technology.

*Management of Farm Irrigation Systems* is another ASAE-published manual illustrating how to manage a for-profit irrigation system without compromising the environment. More than fifty irrigation experts from around the world lent expertise to the techniques discussed. To order, contact ASAE: 616-429-0800, Extension 41.

*Urban and Regional Conflict Resolution in Water-Related Issues* contains papers presented during the October 1991, ASCE Annual Convention and Exposition. To order, write ASCE, 345 East 47th Street New York, New York 10017.☐

## Unraveling the Mystery of Contaminated Aquifers

Engineers are finding that re-releasing chemicals into underground aquifers might be the best way to crack the mystery of how water supplies become contaminated in the first place.

Colorado State University Agricultural and Chemical Engineer David McWhorter and researchers from seven other universities are intentionally releasing chemicals into an already heavily contaminated Canadian aquifer. Their aim is to pinpoint how pollutants entered and moved through many groundwater supplies worldwide and now may be better cleaned up. The \$3 million, four-year research project is the most in-depth field investigation of groundwater contamination of its kind.

To trace the path that solvents take in groundwater, McWhorter and his fellow researchers have released chlorinated solvents into an isolated section of the Borden Aquifer, located on a military base about 60 miles north of Toronto. Water was injected at one end of the section to simulate groundwater movement. Solvents then were released so they could flow downward and dissolve into the flowing groundwater. Layer by layer, thin portions of the aquifer will be excavated near the release. They will be photographed to determine the paths the solvents took as they moved through the groundwater.

Understanding how solvents behave in groundwater will give new impetus to contamination clean-up. Only about 27 of the more than 1,200 Superfund sites have been cleaned up. Solvents are especially vexing to tackle because they don't fully mix with groundwater but can dissolve enough to flow through the system and pose a health hazard. McWhorter finds the complexity of solvent contamination makes for a challenging mystery that he hopes to help solve.☐

## Environmental Assessments Key to Future of Irrigation Says M. E. Jensen

Marvin E. Jensen, Director of the Colorado Institute for Irrigation Management, spoke to 700 irrigation professionals during the 1990 Irrigation Association Convention in Phoenix, Arizona.

Jensen said, "Society will no longer tolerate inadequate consideration of adverse environmental impacts caused by poorly designed and managed projects." "Irrigation's role in the future," he explained, "will enable more efficient use of available water for crop production, but irrigation development must be integrated with rainfed production capabilities rather than planned, developed, and managed as a competitive enterprise."

He stressed the need for water quality management and noted that the United States does not have a common denominator for assessing the value of water in a river basin or determining the real river-basin cost of using water. He noted that in Australia the system of the "polluter pays" is the rule of thumb. Under the Australian system, water quality control costs are distributed to those users causing quality problems.

He went on to say that "Agriculture, industry, academia, health professionals, policymakers, and environmentalists must work together to assess the real risks associated with agricultural contaminants and develop management policies and practices that strike a balance between public health, environment, and economics." He stressed that specialists in irrigation and drainage need to take leadership in advancing the science and art of irrigation management because "if we don't, others who may know less about the basic principles of water management will impose new constraints that will hinder the development and application of improved technology." □

## USCID Groundwater Meeting in El Paso

A 1991 Regional Meeting on groundwater was held in El Paso, Texas, on January 31-February 2, 1991. The theme of the meeting was **Can Irrigated Agriculture Survive the Groundwater Crisis?**

Naren N. Gunaji, Commissioner of the International Boundary and Water Commission gave the Keynote Address. Joe D. Hall, Deputy Commissioner of the Bureau of Reclamation, and H. W.

Haeseker, President of Boyle Engineering Company, were lunch speakers. Hall's topic was *A Review of Reclamation's Water Resources Programs* and Haeseker discussed a Boyle project, *Water Conserv II*.

An excellent technical program, organized by Joe Summers' Long Range Planning Committee, included presentation and discussion of 13 papers. A study tour on Saturday took participants to visit the Fred Hervey Water Reclamation Plant and the El Paso Solar Pond. Proceedings of the meeting are available from USCID. □



El Paso Study Tour Participants



Joe D. Hall, lunch speaker



Fred Hervey Water Reclamation Plant



Joe Summers in Westin Hotel



Darell Zimelman at El Paso Solar Pond

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## USCID Notes

by Executive Vice President  
Larry Stephens

With this issue, publication of the *USCID Newsletter* resumes, and with it, a commitment to return to a quarterly schedule. This Newsletter includes current news and information that has been collected for awhile — so for some of you, parts may be dated, but we hope that for most of you it will still be of interest.

During the past 18 months, USCID has experienced significant changes. Since USCID was formed in 1951 as the U.S. member of the International Commission on Irrigation and Drainage, the Bureau of Reclamation provided the staff for the office of the USCID secretariat. For 20 years, Stephen H. Poe managed USCID, then I succeeded Steve for the next 20 years. Both of us served USCID on an extra curricular basis while working in Reclamation's foreign affairs and technical communications programs.

Last year, while recognizing the value and importance of USCID and its programs, Bureau management decided the agency could no longer provide the USCID staff and office space.

Subsequently, I retired from the Bureau and reached agreement with the USCID Board of Directors to continue serving as the Executive Vice President, from my office in downtown Denver, Colorado. Under the terms of a similar agreement with the U.S. Committee on Large Dams, I also continue to serve as their Executive Director. This spring, Darla Leslie was added to our team to

serve as Director of Membership and Publications for the two U.S. Committees.

With these changes in place, we are excited about the future of USCID. During the upcoming 12th Technical Conference, U.S. papers for the 15th ICID Congress will be reviewed. During October 1992, USCID will organize the **National Conference on Irrigation and Water Resources in the 1990's**. In addition, the new USCID working committees are becoming operational and will soon be active in supporting the ICID work groups.

USCID's strength, as with most professional societies, is its members — individuals and organizations who recognize the need to support their profession. Active volunteers remain the key to success for organizations like USCID. Our Board of Directors, including President Sid Wilson and Secretary Darell Zimbelman, and the Long Range Planning Committee, chaired by Joe Summers, are excellent examples of active volunteers providing outstanding leadership and assistance for their society.

Currently, we need additional volunteer help in two important areas — membership and publications. Elsewhere in this Newsletter is an article outlining our needs. Please respond if you can help.

With regret, I note the passing of several USCID Members during the past several months — Jack Christopher, Oliver Folsom, David Lytle, Charles Maierhofer, Art Pillsbury, A. R. Robinson and Frank Trelease. I had the privilege of knowing most of these leaders of our profession.

Charles Maierhofer was truly a gentleman who gave much to USCID. As a former president of the Board, he was an Ex-Officio Board Member and often attended Board meetings, providing a historical perspective of USCID. He was involved in the formation of USCID and the 1958 and 1984 Congresses — an invaluable resource. Frank Trelease was a friend and colleague throughout our professional careers. Both Charles and Frank participated in a Board Meeting just a few months before their passing — as always active participants in USCID. I greatly miss their friendship and support!

Finally, a sincere thank you to Bill Klostermeyer, who served as USCID President for six years. Bill provided outstanding leadership for USCID as the organization became more active and during the transition of the past 18 months. He truly personifies the volunteer who is dedicated to serving his profession. Thanks also to Gordon Kruse, who, for three years, served as Secretary in a most professional manner. It was certainly a pleasure to be associated with Bill and Gordon in striving to make USCID an important factor in the U.S. and internationally.

I look forward to my continuing association with USCID and you, the Members. Please write or call whenever we can be of service.□