

## Reuse of wastewater effects being studied

Although treated wastewater has been used for irrigation in Lubbock for more than 30 years, it is only recently that a comprehensive examination of the impact on the soil and underground water supply has been attempted.

Using a network of six underground equipment shelters and one-of-a-kind equipment, Texas Tech University engineers are seeking these answers for the Environmental Protection Agency (EPA) in a soil and root zone study on two area farms. Texas Tech is a subcontractor for Lubbock Christian College which is overseeing the project for the EPA.

Under the direction of civil engineering professors Drs. Heyward Ramsey and Billy J. Claborn and Water Resources Center Director Dr. Robert M. Sweazy, the experiment is being conducted on one Lubbock farm that has been irrigated with treated sewage effluent for more than three decades and on a second farm near Wilson, Texas that has never been irrigated with wastewater.

"We know this is an effective method of treating wastewater," Sweazy said. "We cannot say for certain that no adverse circumstances result on the land. This project is designed to answer that question, one that the EPA has not been able to answer because of insufficient data."

"We will use our data to determine and prevent the contamination of existing groundwater resources," Sweazy said, "and to check on EPA guidelines pertaining to the design of sewage effluent land application systems."

Underground water-collecting systems on three two-acre sites at each farm are being constructed to gather data.

"Our aim," said Ramsey, "is to come up with a water balance. We'll know how much water is going on the land and we'll measure the precipitation.

Then we will develop the balance by determining how much is lost as evapo-transpiration and how much percolates through the soil."

The reliability of the data will depend on disturbing the soil as little as possible. As a result, researchers are digging holes 10 feet deep and 10 feet in diameter at the sites. From these cellar-like excavations that are covered and accessible only by manhole, the researchers are burrowing laterally into the ground at 2-, 4- and 6-foot depths. Soil removed in these diggings is then put in 60-inch by 6-inch trays, called lysimeters. The trays, complete with water extracting tubes, are shoved into the holes and forced against the ground above by inflating rubber tubes attached to the bottoms.

Tube lysimeters, 30-inch diameter steel pipe, also are being used as a check on the tray lysimeters. The steel pipe, in lengths of 3.5, 5.5 and 7.5 feet, is pounded into the ground by a special pile driver. The earth around the pipe is then excavated and an undisturbed sample of soil is removed intact in the pipe. A steel plate bottom and special extracting tubes are attached to trap and remove water that seeps through the undisturbed soil section.

"With the lysimeters," said Ramsey, "we will sample the water that percolates through each tray or tube. We will exert a vacuum on the system equal to the soil moisture tension in the surrounding soil and pull this water out. Then we will check its quantity and quality."

Land above the three subterranean shelters at both sites will be farmed. The two-acre site at each underground shelter will be planted in cotton, grain sorghum or bermuda grass.

Sweazy said the water balance and soil quality are both, to some extent, dependent on how much water is put on and on the crops grown. In

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## NAS group gathers at Texas Tech

Members of the Advisory Committee of Technology Innovation for the National Academy of Sciences (NAS) were hosted by Texas Tech University for a series of briefings on April 22 and a committee meeting the following day.

On Thursday the five representatives of the advisory committee and others invited to make special presentations were briefed by Texas Tech faculty on High Plains water resources, arid land plant resources, exotic game resources in Texas, mesquite utilization, energy research at Texas Tech, solar-powered farm machinery, biogas generation and earth-sheltered housing.

The Texas Tech visit was one of the periodic inspections by the committee to the research programs at various universities and research institutions. Dr. Harold E. Dregne, director of ICASALS, is a member of the committee.

Dregne said the tour acquainted committee members with the various types of research on "unusual technology" at the university. This committee, which publishes several reports annually, attempts to promote internationally research efforts that will ultimately allow man to better use the earth's limited resources.

The first day's briefings began with an introduction to the campus by Dr. Jerry Ramsey, associate vice president for academic affairs, and a report on High Plains water resources by Dr. Robert M. Sweazy, director of Texas Tech's Water Resources Center. Dr. Carlton Britton of the Department of Range and Wildlife Management gave a presentation on game ranching.

Dr. J. R. Goodin, professor of biological sciences, and Dr. Ronald Newton from Texas A&M University

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# Roy spends two years in Sudan researching, forming curriculum

A shortage of trained agricultural economists in Sudan resulted in an invitation to Dr. Sujit K. Roy to spend two years as a Ford Foundation specialist and visiting professor at the University of Khartoum.

Roy, professor and interim chairman of Texas Tech University's Department of Agricultural Economics, said his major activities during his September 1978-August 1980 stay in Khartoum included "formulation of a new graduate curriculum in agricultural economics."

He said the university's graduate curriculum previously involved thesis research only. The new curriculum included a combination of thesis and a series of courses. Other duties he performed included the teaching of a quantitative methods class and the supervision of thesis research of several graduate students.

Roy also conducted research on trade and market analysis for the cotton sector in Sudan. He explained that cotton is a major export product and the country's economy "depends quite significantly on the production and trade of cotton."

While working for the Department of Rural Economy at the University, he helped develop contacts with agencies such as the U.S. Agency for International Development, Food and Agricultural Organization, and others

in an effort to obtain possible projects for the department. This included numerous meetings with persons from these agencies and presenting to them the departmental plans and projects.

"Those efforts fit in with the total picture of agricultural development of the entire country," Roy said. "There are many outside groups and international agencies and national governments helping Sudan."

He added that Sudan is one of the developing countries of the world, and it has great potential in natural resources, such as land and water, for enhancing agricultural development. He believes the country "can contribute significantly to the food supply in that part of the world."

"There is a tremendous effort underway for agricultural and economic development overall; they have a very high potential for agricultural development."

Another potential being studied is a possible supply of high quality crude oil, and, Roy said, the discovery of such a supply would change Sudan's economy substantially.

The greatest problem facing the geographically largest country in Africa is that of infrastructure. Transportation facilities, for example, are inadequate in Sudan. It has adversely affected both production and marketing of agricultural products.

In describing agriculture in Sudan, Roy said the system has a "special feature in that it has two distinct sectors: modern and traditional." The traditional side is characterized by small plots, very little mechanization, and low productivity.

The modern sector is comprised of huge schemes, he explained, using the Geziara Scheme as an example. Over one million acres are under the single management of the Geziara Board.

He said such projects are "composed of tenant farmers—they are the producers. The board supplies fertilizer, seed, and production expertise." Revenues from the schemes are jointly shared by the government, board, and tenant farmers.

"Agricultural policies have become so important because of these large schemes or projects," he added and pointed out that it is very vital that the country have good trained policy makers who are capable of arriving at sound policy decisions.

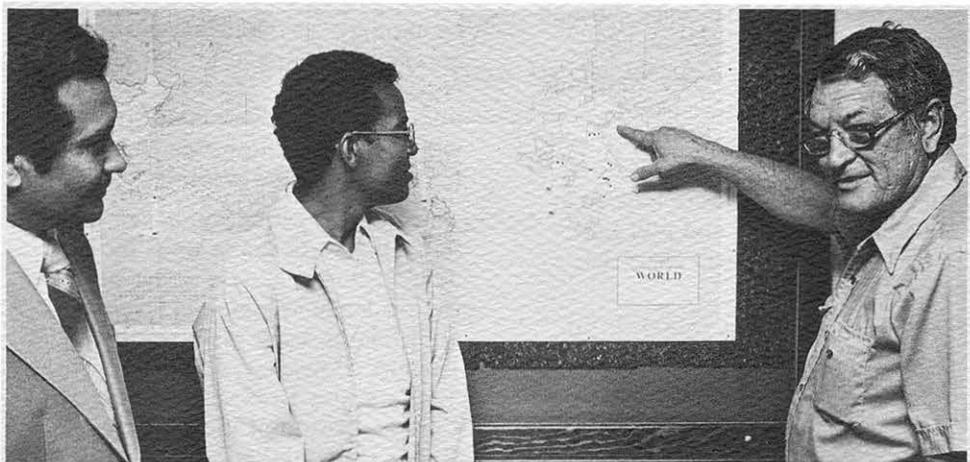
Agricultural extension is another high priority needed to increase traditional farmers' productivity as well as the need for agricultural credit, Roy said.

During his stay in Sudan, he participated in several meetings with the Minister of Agriculture, directors of Sudan's Cotton Public Corporations and Rahad Agricultural Projects (another scheme), directors of USAID, and other international agencies to discuss Sudan's agricultural problems.

He advised the Ford Foundation's staff during the review process for requests for funding and developed budgets for the Foundation project in the University's Department of Rural Economy.

Roy also participated in a number of seminars and conferences on development programs in the Middle East and Africa and especially in the Sudan.

In addition to his work in Sudan, Roy was asked to serve as the external examiner for undergraduate examinations, senior reports and graduate theses in agricultural economics at the University of Dar Es Salaam in Tanzania in 1979 and 1980.



PROJECT ANALYSIS COURSE—Dr. Sujit K. Roy, left, interim chairman of Texas Tech University's Agricultural Economics Department, is one of four coordinators of a special six-week project analysis course for 14 government officials from developing nations involved in national or regional planning and development. Scanning a world map as they discuss development projects abroad with Roy are, center, Gebremariam Berhanu, head of the planning and programming department, Ministry of Tea and Coffee Development, Ethiopia, and right, Dr. Rex P. Kennedy of the Department of Agricultural Economics. Berhanu is attending the U.S. Department of Agriculture-sponsored course for which Kennedy is serving as an instructor.

# Germans fascinated by Western American lore

The influence of German immigrants has been felt for years in many American communities, most notably in the states of Pennsylvania and Texas. More recently, though, American influence, particularly that of the old "Wild West," in the German Federal Republic has greatly expanded, even to the point of Germans spending weekends dressed as cowboys and Indians reliving the past of another country.

Dr. Meredith McClain, of the Department of Germanic and Slavic Languages at Texas Tech University, observed the fascination for the Old West during her visits to Germany. It was not until 1979, however, when she was attending a Fulbright seminar for American German teachers in Bonn, that she began to realize how great the interest really was.

In explaining the location of Lubbock, Texas, to the Germans, she used the term "Llano Estacado", a name given to the Panhandle area by Coronado. The Germans immediately recognized the name and displayed great curiosity in the region.

McClain said she later learned of a nineteenth-century novelist, Karl May, who wrote a series of books about the American western frontier. One of his popular stories was "The Spirit of the Llano Estacado."

Upon researching the author, she found that although May had died in 1912, he is still a best-selling author in Germany. In 1952 an outdoor festival honoring May attracted 100,000 visitors and has continued to draw as many every summer. A more recent festival boasted an attendance of more than 400,000 persons.

McClain also discovered West Germany has "over 150 cowboy clubs with membership totaling about 15,000. The members devote time weekly to the study and exchange of knowledge about the Old West." She added that these clubs hold spring powwows with German Indians and cowboys gathering to trade pelts and costumes over evening campfires.

May never visited the western frontier he wrote about, and sometimes his descriptions of the terrain were not

very accurate, McClain said. Most Germans recognize May's romanticized interpretations, but their fascination with western lifestyles is greater than it has ever been. A group of German "cowboys" even established a small town outside Cologne and named it Lubbock, McClain said.

She added that these German westerners "are devoted to the careful study of authentic details of life on the western frontier." They disregard the Hollywood image of the cowboy and acknowledge that most Americans do not know enough of their own history to make a contribution at German Western-lore meetings.

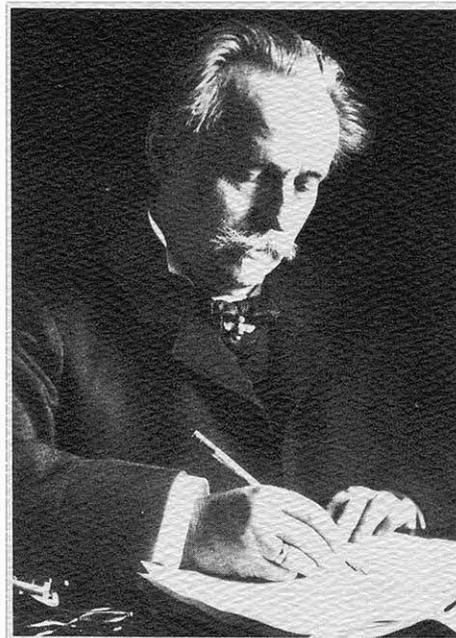
McClain brought this movement to the attention of the Lubbock Chamber of Commerce and was sent on a promotional tour of Germany in March and April by the Chamber, Texas Tech and the Ranching Heritage Association.

This summer she is following up on contacts made during her latest trip. In addition, she is involved in generating interest in a commemoration of the 300th anniversary of the founding of the first German settlement in America in 1683.

Even though this first German community was Germantown, Pennsylvania, McClain said, "When one looks at the vast contribution made to the state of Texas by German-American settlers as well as the current German fascination with Texas, there is good reason for a celebration in Lubbock, Texas—perhaps a German-Texas round-up or a Karl May festival."

She added that the German input into Texas has been greater than anyone ever expected. In the past three years research has been conducted into the 28 German communities in the state, and the studies have shown that the immigration patterns of the Germans differ from those of other ethnic groups.

McClain is also the director of the Southwest Center for Germanic Studies at Texas Tech, an organization that involves several departments and the Ranching Heritage Center of the Texas Tech Museum.



GERMAN AUTHOR—Karl May wrote a total of 73 books, many about the American Old West, which has led to a wave of fascination among the Germans for frontier life. (Courtesy of the Karl May Press in Bamberg)

## Curl named to CID board

Dr. Samuel E. Curl, dean of the Texas Tech University College of Agricultural Sciences, has been elected to the five-member Executive Committee of the Consortium for International Development (CID).

The consortium is a nonprofit corporation organized by 11 major universities in the western United States. It seeks and accepts grants and contracts to carry out development activities in the U.S. and abroad. It provides special expertise in world food problems with particular emphasis on research, training, outreach, technical assistance and institutional building.

Curl and Dr. Harold E. Dregne, director of ICASALS, are members of the CID board of trustees. Texas Tech is represented in the consortium by ICASALS.

Support for Texas Tech's food and agricultural research and development work in Niger, Saudi Arabia, Senegal, Upper Volta, Egypt, Mauritania and Yemen has come from CID. Work, coordinated through ICASALS, has been done by faculty in several of the university's colleges and in the Texas Tech University Health Sciences Center.

# NAS group briefed at TTU

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discussed arid land plant resources; exotic game resources in Texas was the subject of a presentation by Dale Rollins, wildlife management doctoral student. The morning's session was rounded off by Dr. Robert C. Albin, associate dean for research in the College of Agricultural Sciences, who spoke about mesquite utilization.

Afternoon briefings focused on energy research at Texas Tech beginning with the director of the Center for Energy Research, Dr. Marion P. Hagler. He was followed by Dr. James H. Strickland, associate professor of mechanical engineering, who is involved with solar-powered farm machinery research.

Dr. L. Davis Clements of the Department of Chemical Engineering told of his work on biogas generation. Earth-sheltered housing dominated the remainder of the afternoon with a presentation by the chairman of the Department of Civil Engineering, Dr. Ernst W. Kiesling and a visit to an earth-sheltered home outside of Lubbock.

In addition to Dregne, those committee members who attended the meeting were: Carl N. Hodges, director, Environmental Research Studies, Tucson, Arizona; Francois Mergen, School of Forestry and Environmental Studies, Yale University; Dr. Hugh Popenoe, International Programs in Agriculture, University of Florida; and Dr. Donald L. Plucknett, Consultative Group on International Agricultural Research, Washington, D.C.

Also in attendance were: William

# Arid regions of China subject of ICASALS book

"Desert Lands of China", the English translation of a two-part study of the arid regions of the People's Republic of China, is now available through ICASALS, the book's publisher.

Professor Chao Sung-chiao from the Institute of Geography, Academia Sinica, spent part of the summer of 1980 conducting research at ICASALS and completing the first half of the new publication. In "The Sandy Deserts and the Gobi: A Preliminary Study of Their Origin and Evolution", Chao provides definitions and identifications of the various types of deserts which account for 11.4 percent of the total land area of the country.

He also discusses the history and numerous factors contributing to the formation of these arid areas. Maps and tables are used to illustrate wind forces, rainfall levels, land types, and the composition of some desert surfaces.

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Bradley of New Hope, Pennsylvania; Peter Felker, assistant research scientist, Caesar Kleberg Wildlife Research Institute, Texas A&I University; Dr. Richard Harwood, director of Organic Gardening and Farming Research Center, Emmaus, Pennsylvania; and Dr. Ted Sudia, deputy science advisor to the Secretary of Interior, Department of Interior, Washington, D.C.

Four NAS staff members from the academy offices in Washington, D.C. were present at the meetings: Dr. Noel Vietmeyer, Mary Jane Engquist, Jeffrey Gritzner, and E. Griffin Shay.

Chao collaborated with Professor Han Chin of the Lanzhou Institute of Desert Research, Academia Sinica, on the second half of the publication, "Large-Scale Agricultural Reclamation in the Tarim Valley and its Impact on Arid Environment".

The Tarim River, the largest inland river in China, encircles the largest sandy desert of that country and has been a major source of irrigation for thousands of years. According to the authors, however, reclamation has brought adverse impacts, some of which have turned out to be very critical, such as salinization and desertification.

Included in this section are two pairs of maps which compare underground water levels and mineralization of 1958 and 1973, a period during which most modern reclamation efforts were conducted.

ICASALS' director, Dr. Harold E. Dregne, with whom Chao consulted during his stay at Texas Tech University, said this report is "a contribution to an understanding of the origin and evolution of the desert environment and of man's impact on a portion of that environment."

He added, "The visit provided ICASALS with a rare opportunity to make available to an English-speaking audience an authoritative report on the extensive but little-known deserts of China."

"Desert Lands of China" can be ordered for \$5.00 from ICASALS, P.O. Box 4620, Texas Tech University, Lubbock, Texas 79409.

NAS COMMITTEE—Dr. Carlton M. Britton of the Department of Range and Wildlife Management, far right, gave a presentation during the meeting of the NAS Advisory Committee of Technology Innovation at Texas Tech University April 22-23. Observing the presentation are, left to right; Dr. Harold E. Dregne, Dr. Hugh Popenoe, William Bradley, Peter Felker, Francois Mergen, Dr. Noel Vietmeyer, and Dr. Ronald Newton.



# Adaptability of African bean tested at TTU

The morama bean, a drought-resistant food plant that serves as a major staple in the diet of Kung! tribesmen in the Kalahari Desert of Botswana, is being studied by Texas Tech University researchers to determine its suitability for cultivation in semi-arid West Texas.

"We are doing germination studies now in greenhouses," said Dr. J. R. Goodin, professor of biological sciences and director of the research project. "By next spring, the experiment will have moved outdoors and the seeds will be planted in experimental plots."

The greenhouse studies will determine a flower and seed production schedule, as no morama seed has been produced yet in Texas. The open-air studies will test the morama plant's ability to withstand cold, moisture, wind and blown dust.

"So far as is known, the morama can survive in up to 18 inches of rain per year, just right for semi-arid West Texas," Goodin explained. "It's probably frost-sensitive, which might be a problem this far north."

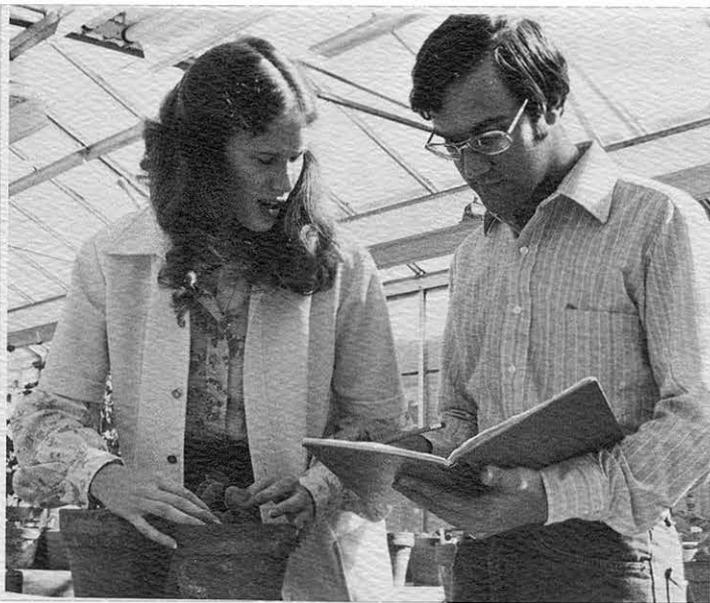
The Kalahari Desert of Botswana is about as far south of the equator as much of Texas is north of the equator.

Morama is a legume that produces slender vines up to 18 feet long. The tuber, or edible root, can be baked or boiled. The seed pod contains from two to six round, slightly flattened seeds, about three-fourths of an inch in diameter. Slimy and tasteless raw, the seeds are best after roasting, which gives them a peanut- or cashew-like flavor. The beans, which contain 33 percent protein and 544 calories per 100 grams, are "loaded with oils and proteins," according to Goodin.

The project is being funded by the Department of Energy as part of a larger project coordinated by Dr. Joseph Bousquet of the Center for the Study of Human Adaptation at the University of Texas at Austin.

Scientists at the Center intend to market the bean by selling morama

MORAMA RESEARCH—Ruth T. Reeder and Timothy P. Brubaker record their observations of a young morama bean plant as part of the research to determine the plant's adaptability to West Texas.



seed through farmers' cooperatives, where they will seek out contacts for introducing the crop. They hope that the local farmers' cooperatives will then buy and market the crop.

The morama bean thrives under semi-arid conditions, so no irrigation will be necessary for its cultivation. If markets could be developed for the bean, energy could be saved by converting irrigated acreage to dryland farming in the High Plains, where irrigation water must be pumped from the depleting aquifer at an ever-increasing energy cost.

Goodin's interest in high-protein plants developed at the International Arid Lands Conference on Plant Resources at Texas Tech in 1978. The conference centered on new and unusual plant resources for food, forage, medicinal and industrial uses and was attended by experts from 20 foreign countries.

"We're really interested in all kinds of arid-adapted plants to be used for foods, clothing and medicines," Goodin said.

Setbacks have already been encountered at the beginning of the project. Morama seed is only available in Botswana, and bureaucratic snags impeded quick export of the seed.

"It's been a struggle to get the seed here. The seed was finally brought to this country by a diplomat who was able to get it out. He brought about 20 kilos for the entire project," Goodin said.

Other parts of the overall project are being carried out at three Texas locations: Greenhills Agricultural Experiment Station in Cedar Hill, Chihuahuan Desert Research Institute at Sul Ross University in Alpine, and the University of Texas at Austin.

The researchers hope to discover the morama plant's potential as forage for animals and as a human food source. "We will be interested in what effect morama has on animals and human beings after growing under drought conditions," Goodin said.

Assisting Goodin in the morama research project at Texas Tech are undergraduates Timothy P. Brubaker, a senior agricultural economics major, and Ruth T. Reeder, a senior botany major.

## Traylor tours Chinese cities

Six cities of the People's Republic of China were included in the itinerary of Dr. Idris R. Traylor, Jr., deputy director of ICASALS, who returned June 8 from a month's trip to the Far East.

Included in the tour were the Chinese cities of Beijing (Peking), Xi'an, Shanghai, Hangzhou, Guilin, and Guangzhou (Canton). He also visited Hong Kong and Tokyo, Japan.

# Solar-powered irrigation developed

The uses and benefits of solar energy are being expanded almost daily as researchers at Texas Tech University are discovering as they look into the possibility of solar-powered irrigation pumps.

The Department of Mechanical Engineering has ventured into a two-year, \$182,000 research project to help find an economically feasible way to use solar energy for farm tasks year-round, said project leader Dr. James H. Strickland.

Of the total cost, about \$90,000 was used for two 29-foot, solar-collecting parabolic dishes, a solar-steam conversion system and steam-driven electricity generator, he added. The remainder is committed to salaries, supplies and other costs for developing on-farm uses for solar-produced steam in addition to its use to generate electricity for irrigation pumps, Strickland said. The funds were a line-item grant from the state of Texas.

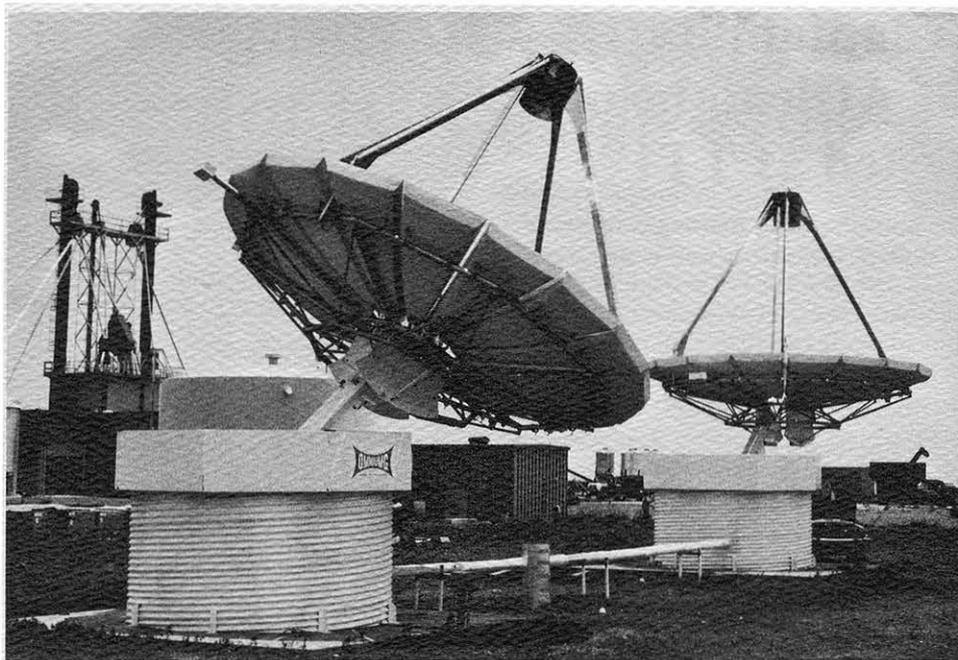
One major use for the heat might be for pasteurizing milk on the dairy site at Texas Tech's laboratory farm in north Lubbock County. Crops on the farm will be irrigated partially via the power from the solar system, the mechanical engineer said.

Another use could be for the steam needs of the Texas Tech feedmill there. Yet a fourth use would likely be heating water normal needs on the Tech farm.

Solar power has possibilities for many farm chores if the experts can overcome three major problem areas, Strickland and two other Tech researchers said.

First, solar energy must be adapted to year-round uses much like the ones Strickland and his associates seek. Second, cheaper but sophisticated solar power production systems must be mass producible. And third, solar-produced electricity must be easily sold on a fair basis to utility companies when farmers are not using the power.

Results of their own and others' studies have convinced Drs. Steven R. Beck, L.D. Clements and Strickland that solar energy systems are still too expensive for on-farm use. Beck and Clements are chemical engineers at Texas Tech.



SOLAR PUMPS—Two 29-foot solar collectors are being studied by Texas Tech University engineers as part of a research project to generate solar-produced electricity for irrigation pumps. The collectors cost about \$90,000 and are located at a New Deal, Texas research site.

As part of the \$182,000 effort, Strickland will build scale models of the scoop dishes, as they are sometimes called, and test them for wind effects on structure. The goal is to determine how cheaply a solar dish, that can withstand environmental hazards, can be made. Wind velocity of 35 miles per hour causes the dishes to shake and de-focus from the sun's rays, Strickland said.

Dr. Ronald J. Pederson, also a Texas Tech mechanical engineer, will deal with the problems of collecting the heat of the solar receivers on the dishes.

Dr. Milton L. Smith, an industrial engineer at Texas Tech, will continue a project already started to develop ways to minimize hail damage to the dishes. Nets have been effective in past trials. Smith also will analyze the economics of using solar systems on the farm.

Strickland said the solar-produced electricity will act as a back-up energy source for one water well pump and will supply only about 25 percent of that pump's power needs.

Emphasizing the need to find alternative solar power uses is the fact that most farmers, especially in Texas, irrigate their crops for varying lengths of time during only about 90 days out of the year.

In 12-month growing seasons found in limited areas of California and Arizona, there is a chance for conventional solar-powered irrigation, Clements said.

Clements and Paul Dellenback, a mechanical engineering graduate student have examined the possibility of using solar power through a special pump for underground water.

"The solar-thermal jet pumping unit that we studied can produce enough underground vapor pressure for a 23-foot lift and can provide about 600 gallons of water per minute," Clements explained.

Yet, the cost of the unit is in excess of \$100,000 which is prohibitive even if a farmer had water only 23 feet below ground level, he said. But the price tag is still much lower than most other systems being studied in the Southwest, he added.

However, such a solar-powered jet pump would provide enough pressure to lift water from an irrigation-water collection pit, a tailwater pit, and return it to the field, he said, but the price is still too high for this endeavor, also.

A common cost estimate puts solar irrigation at \$45,000 per installed kilowatt of delivered energy, and several hundred kilowatts are needed for average water lift depths, Clements said.

Even in the best of circumstances, he said, only 30 percent of the required energy could be supplied by solar devices to pump water 24 hours a day. In a four- to six-month growing season irrigation pumps average running only about 35 percent of the time.

# Desertification, housing topics of publications

As the amount of research and study devoted to arid and semi-arid lands increases, the quantity of literature concerning dry environments also expands and the subject matter treated covers a wide variety of topics, ranging from desert reclamation in the Soviet

## Turkish archive established

Texas Tech University's library recently received the largest collection of Turkish folk tales outside of Turkey courtesy of Texas Tech Horn Professor Warren Walker and his wife, Barbara.

The 3,000 tape-recorded stories are being housed within the newly established Archive of Turkish Oral Narrative of the Library, which competed with many universities world-wide to obtain the collection.

Walker and a research partner spent over 18 years recording the folk tales and often had to travel by horseback or foot to reach some of the more secluded villages in Turkey. The unedited narratives, which range in length from 200 to 125,000 words and last from less than two minutes to ten-and-a-half hours, are stored on more than 400 master tapes.

Eventually the narratives will be translated into English and will be available for reading in the form of bound type-script volumes.

Researchers are encouraged to utilize the archive, for which Mrs. Walker is serving as curator.

Mrs. Walker is also one of the authors of a recently released book about the early years of Mustafa Kemal Ataturk, the national hero and first president of the Turkish Republic. In "To Set Them Free" she and co-authors Filiz and Mine Erol offer a window on Turkey through the growth and achievements of the man who established that nation's firm stance toward the West.

Published by Tompson and Rutter Inc. of Grantham, New Hampshire, the 96-page book celebrates the hundredth anniversary of Ataturk's birth.

Union to designing architecture to meet the special needs of arid areas.

The unique Soviet research journal concerned with desert land reclamation in the USSR and abroad, "Problemy Osvoeniya Pustyn", is now being translated and published in English under the combined auspices of the Institute for Desert Research and the Scientific Council on Desert Development.

This cover-to-cover translation, "Problems of Desert Development," deals with the manifold problems facing desertologists throughout the world. Its subject matter covers a wide range of disciplines, with nearly equal emphasis on physical and biological studies.

The Institute for Desert Research (Turkmenian Academy of Sciences) is one of the main centers in the Soviet Union for the comprehensive study of arid and semi-arid regions. An integral part of the Institute is the Scientific Council on Desert Development, which was established in 1967 to provide for the exploration and development of desert territories in Central Asia and Kazakhstan.

"Problems of Desert Development" is the official journal of these two organizations. The bi-monthly periodical publishes theoretical and experimental results of research in desert land reclamation primarily in the Soviet Union and also in foreign countries.

The journals are available on an annual subscription basis for \$195 (plus \$20 outside the U.S. and Canada) and may be ordered from the publisher: Allerton Press, Inc., 150 Fifth Avenue, New York, N.Y. 10011. (continued on page 8)

VISITOR—Dr. Nabil Rofail from the Arab League's Arab Center for the Studies of Arid Zones and Dry Lands in Damascus, Syria visited ICASALS June 15-16 where he described his work in groundwater research to ICASALS' information specialist, Kathryn McCorkle.



## Water resources expert visits ICASALS

A June visit to the U.S. provided Dr. Nabil Rofail from the Arab Center for the Studies of Arid Zones and Dry Lands in Damascus, Syria with a "good chance to discuss the latest developments and applications of modeling and data bank systems" of water resources.

The three-week trip was organized by the U.S. Geological Survey and included a visit to ICASALS June 15-16, where Rofail, who heads the Groundwater Department of the Center's Water Resources Division, met with experts in the fields of arid lands and water resources.

Rofail said he is interested in mathematical models that will aid in the predicting of groundwater flow, levels, and compositions according to proposed development plans.

During his stay at Texas Tech University Rofail met with Dr. Billy J. Claborn of the Department of Civil and Mechanical Engineering and Dr. Robert M. Sweazy, director of the Water Resources Center, who briefed him on research dealing with the Ogallala aquifer that supplies the Texas High Plains.

Rofail said he was especially interested in the mathematical model and data bank system used in the research.

He said he is "also interested in the studies of arid lands carried out by ICASALS and the different ways of treating the problems of water resources." ICASALS' director and deputy director, Drs. Harold E. Dregne and Idris R. Traylor, Jr., discussed with him the various projects ICASALS is involved in and provided numerous publications to be taken back to Damascus.

# Arid lands publications

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A collection of writings entitled "Desertification in Extremely Arid Environments" has been published by the Geographical Institute of the University of Stuttgart on occasion of the 24th International Geographical Congress held in Japan last year.

Ten authors from five different countries have contributed to the book, a product of the International Geographical Union Working Group on Desertification in and around Arid Lands. Its Subgroup on Extremely Arid Environments is headed by Dr. Wolfgang K. Meckelein, from the University of Stuttgart, who is also the editor of the publication.

The papers address the problem of desertification facing areas in both Africa and the Middle East. All of the papers, with the exception of one that is published in French, are in English with summaries in English, French, and German.

The 203-page publication contains 53 figures and 16 tables. It is available through Stuttgart Geographical Studies, Geographical Institute of the University of Stuttgart.

Architectural Press Ltd. of London has announced the publication of "Housing in Arid Lands, Design and Planning", a collection of writings by 20 authors, including one by the book's editor, Gideon Golany.

The essays devote special attention to the unique factors involved in the design and construction of buildings and communities in arid regions. Solar heating and cooling systems, underground housing, and building materials are among the major points covered by the contributors.

Architectural Press Ltd. has also produced several other publications dealing with this subject, such as "Housing, Climate and Comfort" by Martin Evans who provides a practical guide to design in the Third World, both in wet and dry topics.

Examples of building form and construction and lists of suitable plants are contained in "Design Primer for Hot Climates" by Allan Konya. R. & M. Adams and A. & A. Willens are the authors of "Dry Lands: Man and Plants", which takes both a theoretical and a practical approach to the problems of dry lands.

Written by an environmental specialist, "Planting Guide to the Middle East", gives detailed information on suitable plants for landscape works in the Middle East. "World Solar Architecture" contains over 100 international case studies demonstrating solutions to problems of solar design presented against a technical background and is by S. V. Szokolay.

# Lecture series speaker dies

The staff at ICASALS regretfully reports the death of Dr. Charles L. Wood, an associate professor of history at Texas Tech University who specialized in agricultural history of the American West. Wood, who was a member of the Association for Arid Lands Studies, an author, and the last speaker in the recent "Arid Lands and Human Responses" lecture series at The Museum of Texas Tech, died in Lubbock on June 16.

## Wastewater

(continued from page 1)

addition to varying crops, water application rates also will be varied.

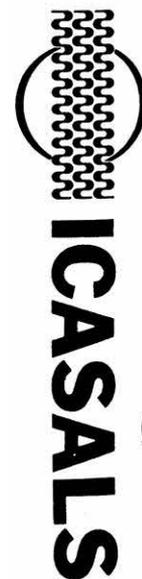
"For example," Sweazy said, "cotton uses maybe 150 pounds of nitrogen per acre per year and bermuda uses 500 pounds of nitrogen per acre per year. Grain sorghum with its leafy area will evapo-transpire more water than cotton. So, we have to look at the effects different crops have on water quantity and quality."

Completion of the laboratories is expected by late spring at which time gauged irrigation, using sprinkler systems, will begin. In addition to constructing the laboratories, research teams have been gathering data on existing groundwater quality and soil conditions at both farms to provide baseline data with which to compare experimental results over the next three years.

ADDRESS CORRECTION REQUESTED

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