February 1983 No. 18

ARID LANDS NEWSLETTER

Office of Arid Lands Studies • University of Arizona, Tucson

COVER: Black-tailed jackrabbits *(Lepus californicus)* are long-eared and long-legged, erratic runners through semiarid and arid landscapes of western North America. Their occasional high leaps *(cover photo),* while being chased, allow them visual and auditory surveillance of the terrain for additional predators, as well as for paths of escape. If body temperature is higher than air temperature, their thin and nearly naked external ears can work as radiators, when flushed with circulating blood, for ridding the body of excess heat. Under highest levels of solar radiation and peak ambient temperatures, blood flow to the enormous ears is drastically reduced so as not to bring heat into the animal. Such appendages as these ears, along with insulating fur, tolerance of high internal temperatures, and use of midday shelter from the sun, reduce the need for evaporative cooling and its costly loss of water not easily replaced. During night cold, while blood flow to the ears is also restricted, now it is to conserve heat.

—*Wade Sherbrooke*

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CENTRO ECOLOGICO DEL DESIERTO DE SONORA

Victor Suarez

Victor Suarez was a guest lecturer at the University of Arizona, December 10, 1982, describing for the benefit of the Office of Arid Lands Studies, representatives from the Arizona-Sonora Desert Museum, and the Governor's Commission on Arizona Environment, the planned program underway in the neighboring state of Sonora — which shares much of the environmental attributes of Arizona's portion of the Sonoran Desert — that is expected to create a Sonoran Desert Ecological Research Center. We offer you here some general considerations expressed by Sr. Suarez which it seemed to us manifest the role that such an undertaking can play throughout the endangered arid world, areas comparable in every respect for which the Sonoran plan might serve as a model.

The study area is located south of Hermosillo, the capital, and just off the international highway between Nogales, Arizona, and Guaymas, Sonora (29°4'N, 110°57'W), with a total area of 572 ha. It has a great variety of plants and several respresentative desert ecosystems. Because of the unique aspects of the area and the program, it is expected that the Center will attract not only Hermosillo's quarter of a million and more inhabitants, but international visitors as well.

The goals of the Center include:

- public displays of desert ecosystems, ways of use, conservation, and regeneration
- an increase and improvement in the knowledge of the desert through education and research activities
- preservation of the environment of the Center itself
- preservation of several species in danger of extinction

To implement and develop these objectives, there are three large areas: recreational (including activities related to children, such as playgrounds, picnic areas, walkways, etc.), animal displays where animals may be observed in their natural habitat, and research experimentation to integrate three types of sequences, i.e., all areas where research will be undertaken. The Center's larger areas will then be segmented into zones:

- modified ecosystems
- large breeding zone
- research Center
- minor breeding zone
- green belt
- open recreational area
- open exhibits area
- covered exhibits
- nucleus zone
- experimental zone
- buffer zone

Initial investment costs will be covered by the State government and those private institutions concerned with environmental protection through memberships and other modes of cooperation. The Center, nevertheless, will eventually be economically self-sufficient through visitor fees, sale of articles and food, and other activities carried out. Research costs will be augmented through help from institutions interested in the protection of the desert environment. The Center will be autonomous, and will cooperate by assistance in appropriate programs of both government and private agencies.

The setting and development of a network for conservation and protection of cultural, historical, and natural resources will be significantly promoted with the creation of the Centro Ecológicol del Desierto de Sonora.

Site (foreground) of the Centro Ecológico del Desierto de Sonora (Hermosillo, background).

Here are his own words as he introduced the concept to us:

Ubicación filosofica y téorica: Hombre, sociedad, medio ambiente:

La creación de un parque natural como el que se pretende llevar a cabo en el sitio asignado al Centro de Investigaciones Ecológicas del Desierto de Sonora, en las inmediaciones de la Ciudad de Hermosillo, tiene una connotación ideológica que debe estar claramente explicitada a los efectos de que por medio de la misma, se pueda ubicar la plataforma sobre la que se asienta el futuro parque y la interconección que tiene con otras instituciones y realidades del Estado de Sonora.

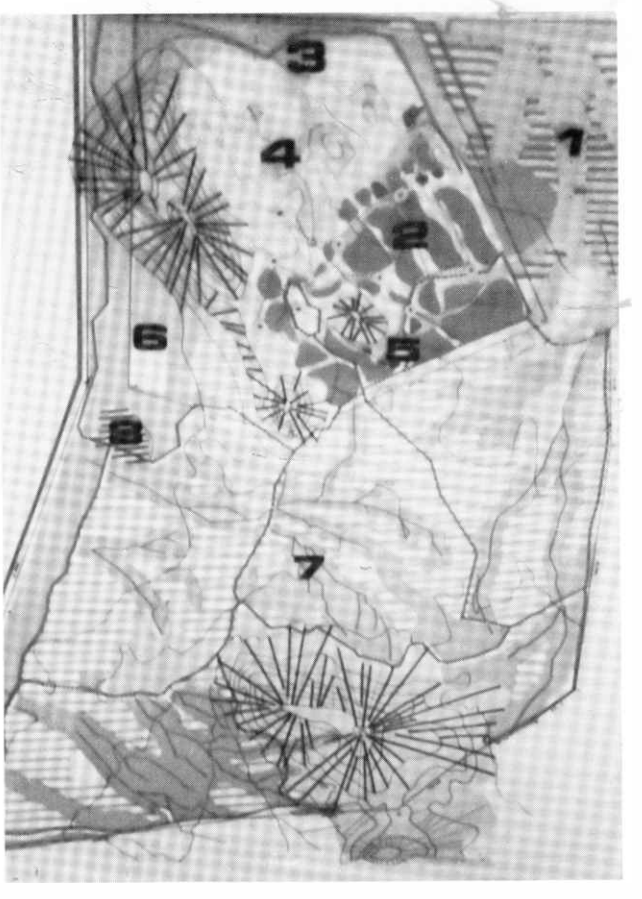
Desde una perspectiva amplia es innegable que el Centro de Investigaciones Ecológicas expressará la acción recíproca entre el hombre y la naturaleza, que dicho en una forma más simple sería la relación entre el hombre, la sociedad y el medio ambiente. En un sentido amplio esa interacción se podría expresar como el empleo de los recursos naturales de todo tipo por parte de la sociedad, sean estos — energétics, minerales, forestales, agrícolas, faunisticos, recreativos, etc.

El empleo y la apropiación por parte de la sociedad de una parte de los recursos naturales produce inevitablemente un cambio y transformación del propio medio ambiente que equivale a una transmutación de las conexiones internas y de los procesos. Esta realidad es una situación que se observa tanto en Sonora como en cualquier otra parte del mundo; refleja la historicidad por la que atravesó ese medio ambiente, y en ella está expresada las transmutaciones de las conexiones internas y de los procesos.

Contact: Sr. Victor Suarez, Edificio Alfonso 202, Hermosillo, Sonora, México (tel: 621-38823) for a detailed copy of the plan which includes lists of species, a description of the climate, vegetation, and topography.

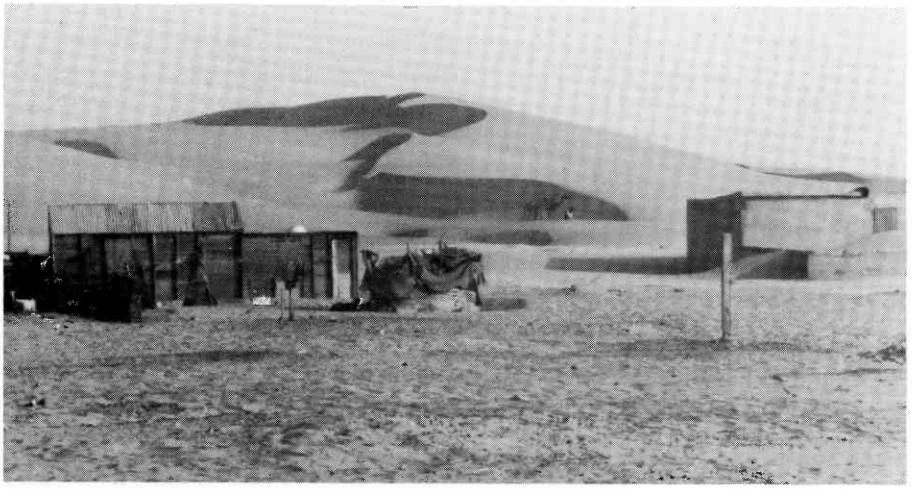
Typical landscape of Centro area.

El accionar del hombre y la sociedad con respecto al medio ambiente implica tener en claro dos tipos de cuestiones y una de ellas es referente a la necesaria utilización de los recursos naturales para el consiguiente abastecimiento de la demanda de la población por un lado y por el otro las cuestiones relativas a la protección de la naturaleza y al medio ambiente como una situación esencial que debe correlacionarce con la primera. Lamentablemente una parte de la historicidad de las relaciones hombre-medio ambiente hicieron recaer el acento en la primera de las cuestiones mencionadas en detrimiento de la segunda, con las consiguientes lamentaciones, un poco tardía, que hoy se observan con referencia a la degradación e inclusive muerte de los ecosistemas.



Clasificación de las areas de Reservas Naturales:

1 = parques nacionales
2 = parques submarinos
3 = monumentos naturales
4 = distritos de acuacultura
5 = cotos de caza
6 = áreas de valor histórico cultural
7 = zoológico ambiental
8 = puesto de pesca en presas



Typical older settlement remmant, not (yet) brought into the reforestation project.
[See camels in shadow of dune, background.]

Project signboard, with checkerboard pattern of Euphorbia planting, background, to help fix dunes.

A view of successful Prosopis plantation begun in 1977.

REBOISEMENT DE NOUAKCHOTT: LE PROBLEME DE TOUS

Gerrit ten Velde*

Desertisation et Desertification

La Mauritanie est un pays Sahelien qui subit actuellement les conséquences d'une sécheresse persistante. Sa capitale Nouakchott est une ville "artificielle" dont la croissance a commencé en 1960, après l'Indépendance, près d'un ensemble de maisons en banco entourant un poste militaire: le Ksar, situé près de l'Océan Atlantique dans un paysage de dunes couverts par une végétation peu luxuriante. Cette végétation a commencé à disparaitre avec les premiers travaux. La sécheresse, dès le début des années 1970 rassemble une population de nomades autour de la ville, ainsi en un peu plus d'une dizaine d'années Nouakchott passe de 45.000 á 300.000 habitants. Pour délimiter les campements les Euphorbes sont arrachés et servent de matière première pour réaliser des clôtures.

Les troupeaux et les habitants devenus de plus en plus nombreaux piétinent le sol qui perd son couvert végétal favorisant et multipliant les vents de sable, les Prosopis de grande taille sont abattus ainsi que tout ce qui peut fournir du bois, les animaux doivent se partager les quelques plantes vertes qui n'ont pas le temps de se développer prenant ainsi un aspect inhabituel (pseudomorphose de broutage). Ainsi l'homme désertise les environs de Nouakchott accentuant les effets de la sécheresse, de la désertification due au manque de précipitations. Les premières conséquences de cette double action de la nature et de l'homme se manifestent au Nord de la ville où les dunes destabilisées sont ravivées par le vent et déplacées vers le Sud Ouest. Le Ksar est menacé. Devant cette situation critique, les autorités mauritaniennes en collaboration étroite avec la Fédération Luthérienne Mondiale mettent en oeuvre un projet de reboisement, son but: stabiliser les dunes du Nord de Nouakchott.

Une Pepiniere Pleine d'Avenir

Les responsables mauritaniens du projet oeuvrent en coopération avec des consultants appelés par la Fédération pour mettre sur pied le projet.

Le choix de l'arbre se porte sur *Prosopis chilensis,* arbre qui semble adapté à la situation pluviométrique de la région. Une pépinière est aménagée d'avril à août'75, en septembre de la même année les premiers semis sont effectués, 700.000 graines seront ainsi semées pour la première campagne de plantation.

Cette pépinière doit fournir les jeunes arbres nécessaires aux trois campagnes prévues (1976-1977-1978) l'évolution du projet montrera l'importance de la pépinière, qui fournit encore 7 ans après sa création, des arbres destinés à l'ensemble du pays.

La Ceinture Verte

Elle doit constituer un massif forestier homogène de 700 ha ayant la forme d'une bande en zig-zag de 7 kms de long sur 1km de large. 3 campagnes de plantations sont prévues:

1976	200 ha	500.000 plants
1977	250 ha	625.000 plants
1978	250 ha	625.000 plants

La densité des plantations est élevée: 2.500 plants par hectare. Il s'agit d'assurer un taux de survie convenable, des arrachages seront nécessaires pour atteindre une densité suffisante de 600 à 700 arbres par hectare.

La pluviométrie reste le facteur capital de la réussite du projet. Avant la sécheresse, les précipitations dans la région de Nouakchott représentent 120 mm. La moyenne au cours des années 76 à 82 est de 52 mm. Cette pluviométrie insuffisante pose le problème de l'arrosage des plantations. Dans une capitale où l'approvisionnement en eau est problématique, il faut savoir raisonnablement faire la part des choses.

Le coût de l'entretien par hectare est très élevé et le budget initial prévu pour 700 hectares ne pourra assurer l'arrosage que de 325. En effet, les difficultés se font sentir au cours de l'hivernage de 1977: 2, 5 mm de pluie sont enregistrées.

Ce manque de précipitations impose de planter la moitié de la zone prévue pour 1977 et de maintenir l'arrosage de la zone plantée en 1976. Ce contre-temps va permettre de constater que dans la zone plantée, la végétation autochtone reprend vie. C'est un tournant dans l'évolution du projet. Plutôt que d'implanter le Prosopis, on cherchera à aider la Nature pour qu'elle surmonte les effets de la désertification.

Stabiliser Pour Regenerer

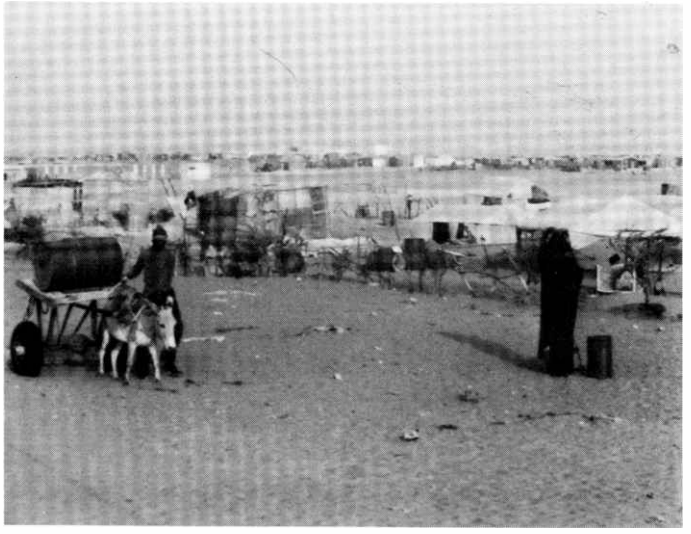
Dans un premier temps il s'agit de stabiliser les dunes vives en plantant des palissades d'Euphorbes.

*Fédération Luthérienne Mondiale, Projet Mauritanie, B.P. 431, Nouakchott, R.I.M. (Tel: 529-90).

Euphorbia balsamifera est un arbuste doué d'une étonnante capacité de regénération. Un bouturage effectué sans précautions à particulières et sans arrosage donne pratiquement à chaque fois un résultat positif. Les Euphorbes sont récoltés très au Sud de Nouakchott où ils abondent. Cette récolte est effectuée méthodiquement car il ne s'agit pas de recréer quelques kilomètres au Sud les conditions qui ont abouti à la situation que connait Nouakchott actuellement. La bouturage des Euphorbes donne un résultat encourageant. Le pourcentage de reprise de boutures est très satisfaisant compte tenu qu'aucun arrosage n'est assuré pour ces plantations. L'hivernage 1981 vient encourager cette nouvelle optique du projet, des graines de Prosopis semées à la volée dans les zones à Euphorbes germent spontanément, et les jeunes arbres agés d'un an sont actuellement aussi vigoureaux que ceux des plantations de 76 et 77.

A specimen of well-developed *Euphorbia balsimifera.*

A mixture of old (foreground) and new (background) with the beginnings of a Prosopis hedge. Donkeys are in common use [this fellow looking pretty content with his cast-off automobile tires to help draw the load!]



Pour Aider La Nature

Des études sont ménée pour inventorier et sélectionner les variétés autochtones qui pourraient être semées ou repiquées. C'est ainsi que sont étudiées les espèces suivantes:

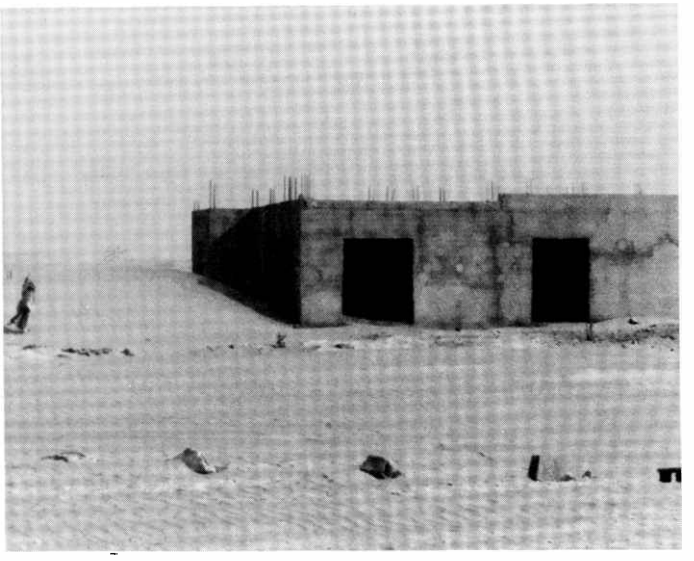
Salvadora persica, Tamarix aphila, Leptadenia pyrotecnica, les genres Salicorni et Acacia.

La reconstitution du milieu naturel est donc possible dans la mesure où les plantes trouvent elles-mêmes leurs conditions de développement et principalement l'eau. L'arrosage des premières plantations de la "Ceinture Verte" a donné aux jeunes plants une certaine fragilité devant les conditions climatiques que n'ont pas les Prosopis dont les graines ont germé naturellement lors de l'hivernage '81/.

Seule la stabilisation du sable par une végétation de première génération *(Euphorbia balsamifera)* pourra aider une végétation de deuxième génération à réapparaitre dans les zones de dunes. Les Euphorbes étant utilisés à défaut d'autre matériel disponible (moyens mécaniques ou autres végétaux).

Reboisement Et Developpement

La Mauritanie dispose des moyens matériels pour lutter contre ce fléau qui est la désertification. La Fédération Luthérienne Mondiale a mis à sa disposition les possibilités de réaliser elle même une politique de reboisement qui est maintenant l'affaire de tous. Elle aide les cadres mauritaniens à mettre en oeuvre le fruit de leur esprit de créativité. Elle encourage et stimule tout ce qui pourra aboutir à la mise sur pied d'une technique efficace de fixation des dunes employant un minimum d'eau, technique qui pourrait être ensuite utilisée dans d'autres régions de la Mauritanie. Les réalisations sont encourageantes tes et motivent de plus en plus les populations. De nombreuses décisions des autorités poussent les habitants de la capitale à planter des arbres dans les zones d'habitation. La pépinière fournit les arbres nécessaires aux opérations ponctuelles de plantations dans les différentes régions. La création de la journée de l'arbre symbolise le soucis du gouvernement de promouroir une politique de regénération du milieu naturel.



Modern construction threatened to be engulfed by encroaching sand.

A view of an older settlement of drought victims, with Prosopis planting, background, provided by FLM nurseries.

Les Espoirs

Les réalisations concrètes du projet de reboisement ainsi que la très nette sensibilisation des populations citadines permettent de penser sans optimisme exagéré que dans un premier temps la stabilisation des dunes vives situées au Nord de Nouakchott pourra être assurée. Ce n'est qu'une fois cette étape d'achevée que l'on pourra envisager un vrai programme de reboisement.

THE REFORESTATION OF NOUAKCHOTT
(English Abstract)

At the western edge of the Sahel region, Mauritania, like its neighbors, experienced a prolonged dry spell throughout the 1970s. Fleeing the strangling desertification caused by this climatic change, tens of thousands of Mauritanians moved to the capital, Nouakchott. In the process the migrants caused that newly-created settlement to grow from a town of just 45,000 to a dense city of 300,000 in a decade. The effects of this migration compounded the already serious consequences of the drought. In the coastal strip north of the capital known as the Ksar, camp residents have removed the few remaining strands of vegetation for use as firewood. Large Prosopis trees and entire stands of Euphorbia have disappeared, exposing sand dunes and menancing the equilibrium of the Ksar.

Since 1976 the Mauritanian government, assisted by the World Lutheran Federation (WLF), has sought to restabilize the dunes and thereby mitigate the dual effects of man and nature. As a solution, planners and scientists, cognizant of the new, lower levels of precipitation, decided to introduce *autochtonous* plants.

The plan envisioned a green belt encircling the city of Nouakchott. The zone was to be composed of Euphorbia palisades and stands of Prosopis. *Euphorbia balsamifera,* a hardy variety which grows abundantly south of the capital, and *Prosopis chilensis,* a species adapted to the pluviometric conditions of the region, were selected for the afforestation venture. Other species with promising potential are: *Salvadora persica, Tamarix aphila, Leptadenia pyrotecnia, Salicorni* spp., and *Acacia* spp.

The initial scheme called for stabilizing 700 ha of dunes with a total of 1,750,000 plants. But because even these arid lands specimens required more than the 52 mm of annual rainfall available, they needed some irrigation. As a result, the experiment continues on just 325 ha.

According to the author, Mr. ten Velde of the WLF, the Mauritanian authorities have been eager for the project to succeed. The reforestation effort, in their estimation, symbolizes the government's attempt to promote regeneration of the natural environment. In the author's view, the results to date have been encouraging; already there has been considerable stabilization of dunes north of the city. Only when this pilot project has been successfully completed can a major afforestation program be undertaken.

—R.G. Varady

AN INTERVIEW WITH DR. H.S. MANN UPON HIS RETIREMENT AS DIRECTOR OF THE CENTRAL ARID ZONE RESEARCH INSTITUTE

H.S. Mann

PP: Dr. Mann, I can imagine the ambivalence with which an active person of your nature will be viewing 'retirement' — and I use that word advisedly because I am sure you will not be retiring in the sense that you are dropping out of any further participation in the activities in which you have been engaged for so long. Right?

Mann: Yes, you are right, so right. My schedule seems to be more crowded than ever.

PP: What are you up to currently? Are you traveling, or consulting, or doing personal research from which your administrative duties have pre-empted you during the last decade?

Mann: Some of all of these. For instance, I had hardly settled down in my home in Ludhiana [Punjab] after my formal retirement from CAZRI in April of last year, when I was off on an FAO mission to the People's Republic of China for six weeks, and later, during September-October 1982, five weeks in Nairobi as a consultant to UNEP. In between there were a couple of weeks in the USSR, Moscow and Ashkhabad, for an evaluation of a joint UNEP/USSR International Training Project. You know about comparable courses from the notice you gave in a recent issue of your *Arid Lands Newsletter* to the one on river basins, but this one, on 'Desertification Control Training Courses,' is now underway, too, with over 200 technical staff from 44 countries at work.

PP: I am sure that many of us who have been engaged to one extent or another in this phenomenon are convinced that something as practical and 'real-world'-oriented as these courses is a great step forward in carrying out the Plan of Action. From your perspective, do you think the Plan is making any progress elsewhere in the arid world?

Mann: Perhaps I shall be better able to respond to your question after I have completed a three-month UNEP assignment to visit several Asian countries, followed by a tour of FAO, UNESCO, WHO, and UNIDO in Europe, to verify this very question: What action is being taken by various governments and international bodies to carry out UNCOD's recommendations? So, ask me again, late spring, when I have had a chance to sort out all the information I shall be collecting.

PP: One of my own early interests when I first joined the University of Arizona's Arid Lands staff was the identification of similar agencies throughout the arid world. And you may recall, though you were not there yet, that CAZRI was included in the 1967 edition of my *Arid Lands Research Institutions: A World Directory.* I imagine much of your satisfaction in over a decade of work there comes from association with one of the arid world's pre-eminent research institutions.

Mann: Thank you for giving me the opportunity to give voice to a firm belief of mine and one that I know you and Dr. McGinnies share with me, namely an acknowledgment that — to quote you from somewhere, I seem to recall — no, everything didn't begin until I arrived on the scene! I inherited a strong respected operation when I came to CAZRI in December 1971, and I am happy to have this chance to pay tribute to those who came and worked and achieved before me.

PP: Nevertheless you must have some long view of what you yourself did accomplish during your tenure, and what you believe you may take the most satisfaction from.

Mann: Well, one thing certainly was my determination to strengthen the scientific staff at CAZRI's three Regional Stations: Pali, Bikaner, and Jaisalmer. Until 1971 these stations had no scientists, no laboratories. All their work was planned and carried out by the staff at Jodhpur. Now each station has a senior scientist in charge, with suitable facilities to carry out the work undertaken. Also, at the twelve Range Management Field Stations in western Rajasthan, scientific work was strengthened, junior scientists appointed at five of these, and specific responsibilities assigned to all twelve.

Also, new lines of relevant research — please emphasize relevant — were initiated at CAZRI: solar energy, for instance, and windpower utilization, soil-water-plant relationships, arid horticulture studies, and the utili-

zation of local plants and vegetation, analyses of the constraints in the transfer of technology from CAZRI to the farmer's fields.

My personal responsibility throughout, over and above the daily operational chores, included ways of collaboration with foreign institutions and organizations, initiating contacts with individual scientists, and receiving an increasing number of visitors to CAZRI. Certainly these contacts, plus continuing research by CAZRI, have made the Thar one of the best studied deserts in the world. While the success of this activity is not one that can be determined immediately, I like to think that over the long haul, it not only provided us with a way of teaching others but also learning from them. It's a two-way street, believe me.

PP: I believe you.

Mann: To elaborate a little on my comment relating to transfer of technology to the field, in 1974/75 CAZRI initiated an 'Operational Research Project' involving our scientists in such a transfer to a few villages near Jodhpur. It is a matter of great satisfaction to all of us that the farmers were quite receptive, and actually have adopted a large number of the recommended practices.

PP: If you were to speculate briefly on what you believe to be CAZRI's priorities in the next decade, say, would you put an extension of such a concept somewhere near the top?

Mann: I do indeed think there is an urgent need to intensify efforts for the welfare of the rural masses. The start which we have already made needs strengthening. We foresaw that the Project would include a study of the constraints — technical, economic, social — in such a transfer of technology to a constituency largely untrained in technical matters, and I hope sincerely that this Project will be given continuing support and promotion, more perhaps than I was able to provide. From the farmers' point of view our economic analyses of the technologies and recommendations we make are quite important, and I am glad to report that a Production Economist with such a specific responsibility has now been appointed. In the next phase of CAZRI's development, a Division of Agricultural Economics has already been approved. In addition, there is a need for some mechanism by which results of our recommendations where operational can be tested under various climatic conditions. Adaptive research we might call it. In collaboration with extension agencies of various Indian states, CAZRI is committed to strengthening this program of large-scale trials under actual field conditions.

Dr. Mann demonstrating uses of an improved grafted variety of the Ber plant *(Zizyphus rotundifolia)* developed at CAZRI.

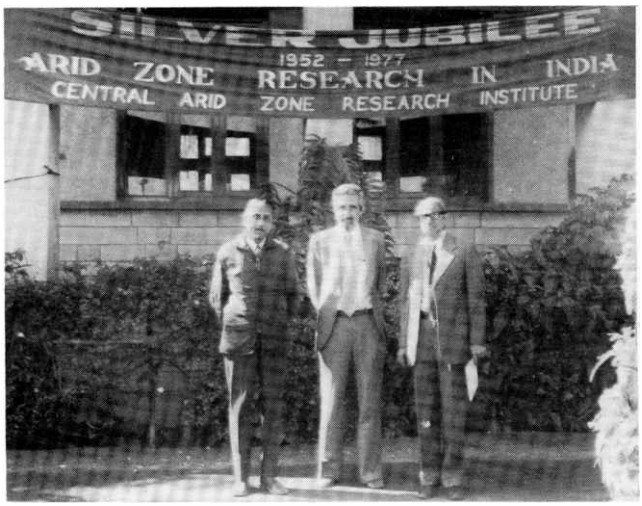
PP: If you were to try to sum up your decade of service to CAZRI, Dr. Mann, what do you think will remain with you the longest?

Mann: Ah, staff relationships characterized by full cooperation, support, and good will. On occasions I have felt overwhelmed by this aspect of the decade, and being only human, that which I shall miss most. But in a practical sense, it might be the conviction that CAZRI has fulfilled the expectations of UNESCO in its early support of the Institute; that our image, both nationally and internationally, has been in great part a positive one; that such recognition prompted the invitation to us to participate in UNCOD through the *Case Study on Desertification* we contributed to the Nairobi conference in 1977. I hope my colleagues, yourself included, will be able to cherish as I do the friendships that mutual interests and concerns with common problems of the arid world create.

Thank you for allowing me to share these personal thoughts with you, and through you, to others who will inherit our problems — yes, we left some! — but also our enthusiasm and commitment.

PP: Thank you, Dr. Mann, and a safe journey for the rest of the way.

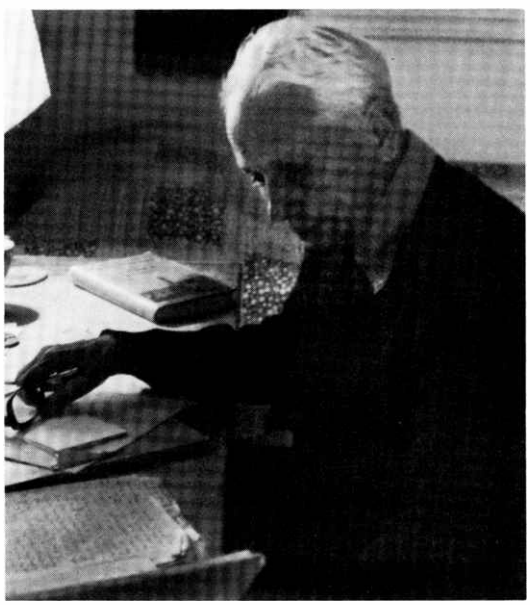
—Patricia Paylore



Dr. Mann, right, is host to the 1978 International Symposium on Arid Zone Research and Development. Dr. P.K. Ghosh, CAZRI, left, Professor J.V. Evans, University of New England, Armidale, New South Wales, center.

AMIHUD GOOR

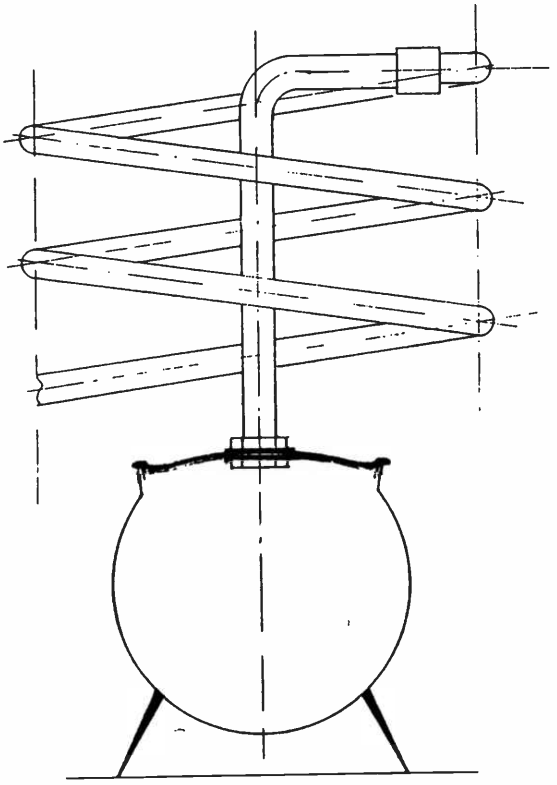
August 16, 1898 - October 10, 1982



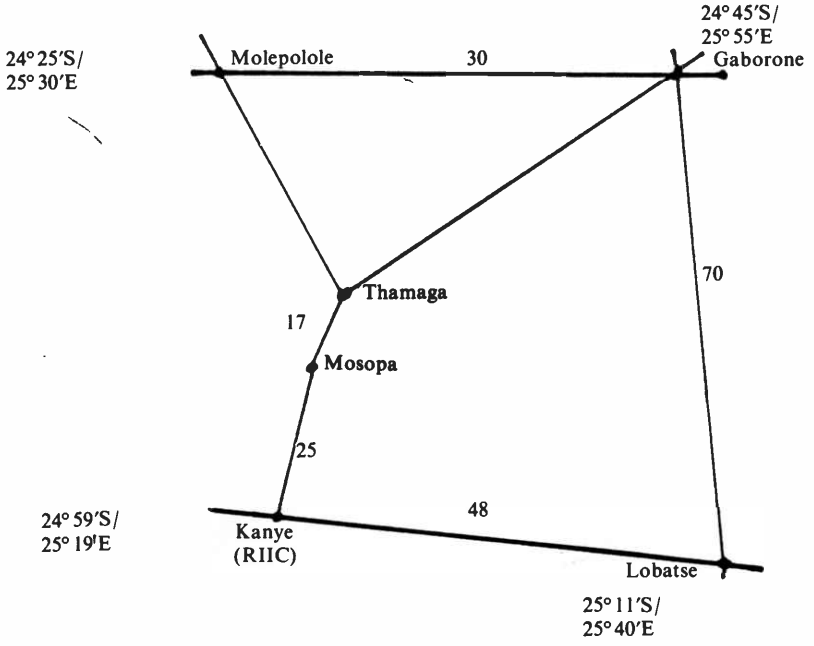
Long known worldwide for his research into the forestry problems of arid lands, Amihud Goor died in Boston on October 10, 1982. Born in Palestine, he was educated at the University of California (B.Sc. 1924, M.Sc. 1925) and Yale University (Ph.D. 1928), and earned another advanced degree in forestry at Oxford (1933).

When Israel became a nation, he was called to organize its first Department of Forestry where he served as Conservator of Forests on various levels until 1960. A world traveler on behalf of FAO as well, his tireless journeying took him to the arid lands of Africa, Latin America, and Asia where he early preached the gospel of tree plantations long before it became the popular topic that so engages our attention presently.

In 1971 the American Forestry Association awarded him the Bernard Eduard Fernow International Forestry Award. His research on erosion, afforestation, and sand control has been published by Oxford University Press, Yale University Forestry School, FAO, and the *Journal of Forestry*. Best remembered, perhaps, for his lifelong efforts to translate forestry into terms of human welfare, Dr. Goor will be missed now that the world is beginning to catch up with him.



RIIC Radiant Still (Night-Sky Radiation Principle)
Scale 1:5



NIGHT-SKY RADIATION STILL FOR KALAHARI DESERT

Rural Industries Innovation Center (RIIC)
Kanye, Botswana

Introduction

RIIC has for some years been doing research on small-scale desalination to produce drinking water for people in rural Botswana. In many parts of this country, especially in the Kalahari desert, the only available water is salty. The main desalination effort at RIIC has been on conventional single-stage solar distillation. We are also studying the principle of night-sky radiation (NSR) as a means of condensing water vapor. Two ideas are currently being developed:

a) nonconvective solar salt-pond coupled to a NSR condenser
b) wood-burning still using NSR condenser

The salt-pond idea is still in the design stage. The second idea has already been tested successfully and is now in a limited implementation stage.

Description of RIIC 'Radiant' Still

The still is made from a traditional three-legged iron cooking pot, as shown in the diagram and inset photograph. Only the lid is modified; the pot itself remains unchanged. The lid has a hole drilled in it, through which the radiating condenser is attached. Any small pot or bucket may be placed below the radiator outlet to receive the distilled water as it drips out.

How the 'Radiant' Still Works

Salty water is put into the pot as for normal cooking, with the modified lid in place. A small fire is lit under the pot. The best type of fire is a hot concentrated one, not extending beyond the pot diameter. The aim is to heat the salt water without heating the condenser coil. This is quite easy in practice, since the coil diameter is fairly wide.

As the water boils, pure steam rises up the galvanized pipe and into the copper coil. Here it condenses, giving off a large amount of heat. This heat must be removed quickly and efficiently, otherwise condensation will stop and steam will issue from the end of the coil. Most condensers are air or water cooled in order to remove the energy released on condensation. In such condensers the distillate is cooled as well as being condensed. In the case of the NSR condenser, the aim is not to cool the distillate, but only to remove its latent heat of vaporization, so that the steam may be converted to water having about the same temperature as the steam. The reason for not wishing to cool the coil is that the amount of energy it radiates away is proportional to the fourth power of the temperature (Stefan's Law). For the most efficient functioning, the coil should have a temperature only slightly below the boiling point of pure water.

The condenser coil of the RIIC 'Radiant' still is designed to dissipate the heat released by the condensation process, without letting the temerature drop too much. It does this by radiating the heat into the surrounding space. For this reason the outer surface of the coil is blackened to make it a good radiator. The walls of the coil are fairly thin and made of copper, which is a good heat conductor. Thus the heat released inside the coil is easily conducted to the outer surface, where it can radiate away.

In general, a good radiator is also a good heat *absorber*. In practice, the radiator coil will be receiving radiation as well as emitting it. It will operate most effectively when its emission is maximized (high coil temperature) and its absorption is minimized (not surrounded by other bodies emitting heat). At night, with Botswana's clear skies, conditions are ideal for maximum efficiency.

Performance

The still has been tested at RIIC and in the field in inhabited remote areas of the Kalahari desert. Solutions of 1-2% kitchen salt in water were used, as well as the actual salty groundwater available to remote area dwellers at the salt pans. The latter contains upwards of 10,000 ppm TDS.

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*Contact Sonja Barrett, Research Officer, RIIC, Private Bag 11, Kanye. Tel: 393
[RIIC is a nonprofit organization doing r&d for rural life improvement.]

Tests were carried out during the day and at night, indoors with a gas ring and outdoors with a wood fire. The still was operated by laboratory staff, interested spectators and the remote area dwellers themselves. All found it very easy to operate.

The still operates batchwise. The pot is filled with salt water about three quarters full at the outset and continues to distill until most of the water has been driven off. It would be very easy to lift the lid and add more salt water to the pot to prolong distillation if desired. At the end of the distillation, a paste of salt crystals and water remains in the pot.

We found that ouptut depends on environmental conditions. Indoors during a hot day, the still produced 0.5 liters per hour. Outdoors at night it produced a liter of distillate per hour.

The distillate was sparklingly clear and tasted good. Its conductivity, measured in the field, was very low, indicating that no ionic matter was present. Even with field samples of water that were discolored and evil-smelling, the distillate was clear and odorless and had a good taste.

Construction Method and Costs

The handle is ground off the lid of a standard three-legged cooking pot. We are using size 3 and 4 pots because these are the most commonly used by the remote area dwellers we have met. But any size of pot could be used (by using a bigger pot and lengthening the coil, output could be increased). A hole is drilled in the center of the lid to take standard 1-inch galvanized water pipe. A 60 to 70 centimeter length of pipe has a thread cut at both ends and is bent as shown in the sketch. The straight end is attached to the lid by means of two nuts and two washers. The bent end is connected to the copper coil via an elbow joint.

For the coil we use 28mm o.d. domestic copper tubing of 1.5mm wall thickness. The outside of the coil is blackened to give good emissivity. We have used two methods of blackening: spray-on heat resistant black paint or treatment with sulphide. We are still testing to find out which coating is better (durability, emissivity, cost, ease of application).

For the prototypes built so far, our costs are as follows, in Pula:

Pot lid (size 3)	5-00
Copper pipe (3.2m)	16-70
Galvanized pipe (65cm)	1-70
Elbow union	4-50
Nuts and washers	1-40
Paint or sulphide	-30
Labor	15-00
	P44-60

Efforts are now being made to optimize the cost for larger-scale manufacture.

Dissemination and Future Plans

Our 'Radiant' still and other small-scale desalinators are being introduced to a limited extent to communities or remote area dwellers (RADs) in the Kalahari desert where drinking water is desperately short. We are keeping the desalinators very small, so that people can carry them away should they have to move to different areas in search of game and wild foods on which they live. We believe also that the people will feel personally in control of a small simple technology that they can understand, rather than a large 'imported' installation. We hope that the RADs will come to see desalination as a process that is 'theirs,' one they can modify and adapt as needs and circumstances change. Already they have discovered that they can use the residual salt for cooking and for curing game skins.

In addition to small solar stills, we are introducing the *lids only* of the 'Radiant' stills to families who already have a pot for their everyday cooking. In the evenings, when these families are accustomed to sitting around a wood fire (paradoxically, there is no shortage of firewood in the Kalahari), they exchange their own lid for the modified 'Radiant' one and distill enough water for the family for the next day.

Questions we still have to tackle are:

i) whether the boiling salt water causes undue corrosion of the pot
ii) methods of adding the correct amounts of mineral salts to the distillate to ensure good health
iii) distribution of modified lids (with or without pots) so that everyone may have good drinking water, but avoiding 'free handouts'

At present we are visiting RAD communities by arrangement with local Councils and Remote Area Development Officers. We are trying to integrate our efforts into the larger context of overall remote area development. Consultations are in progress with the Botswana Government and it is hoped that eventually the implementation of the RAD small-scale desalination program will be taken over by the Government.

Acknowledgments

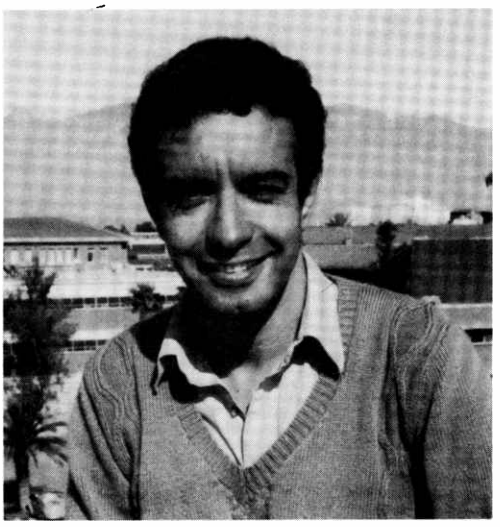
We are indebted to many friends who are helping us. The Botswana Christian Council, African Evangelical Fellowship, and Rosebank Union Church have donated funds, provided transport, helped with getting materials and encouraged us generally. Messrs. Maksal Tubes gave us a very generous free sample of copper tubing for our early experiments. I am also personally grateful to Colin Cram and Peter Fraenkel for stimulating ideas and to Max Ewens for helping with the design of the 'Radiant' still.

FOREIGN STUDENT PROFILES

IX: Rachid R. Labgaa

' . . . a desert with high dunes and vast waterless regions, dotted with hillocks of salt and inhabited by peoples with strange and exotic customs . . . '

—Herodotus, ca 430 BC



Rachid R. Labgaa
—photo by Wade Sherbrooke

That may have been that fifth century BC Greek historian's impression of the Sahara some two thousand four hundred years ago, but the modern Algeria we learned about during our interviews with Rachid R. Labgaa here in our office would not be recognized by Herodotus today. Oh, yes, there are still 'high dunes and vast waterless regions' in the Saharan zone of the country, but now they are transected by modern highways, overflown by sophisticated aircraft, the landscape dotted with drilling rigs and oil pipelines.

We admitted to Rachid, now a graduate student here at the University of Arizona studying ways of applying remote sensing tools and image processing techniques to water resource management in semiarid-arid environments, that we envied our colleagues' recent visits to his native country: our Director, Dr. J.D. Johnson who undertook a mission to Algeria's Project Oued Touil in the spring of 1978, and our Director Emeritus, Dr. William G. McGinnies who was a delegate on the U.S. National Science Foundation's spring 1981 tour of Algeria, sponsored by Algeria's Organisme National de la Recherche Scientifique. Our turn next?

Rachid, a native of the Saharan Atlas Mountains about 200 miles south of Algiers, has behind him already the BS degree in physics (1971) from l'Université d'Alger, as well as an engineering degree in aeronautics and automatics from l'Ecole Nationale Supérieure de l'Aéronautique et de l'Espace, and l'Université des Sciences, Toulouse, France (1975). We supposed it was only natural, with an academic background like this, plus actual experience with Air Algérie, that he would opt here for courses in remote sensing. But he reminded us that even before coming here, he had not only been associated with the Centre d'Etudes Spatiale des Rayonnements, in Toulouse, but at home as well, with Algeria's Centre des Sciences et de la Technologie Nucléaire's Remote Sensing Division, so my inquiry as to whether Algeria had a program 'in place' for the use of space imagery for such developmental problems as agriculture, water, soils, vegetation, or mineral resources, brought a quick and enthusiastic response. He sees the technology of space imagery as a tool that will provide much needed synoptic data on the environments of arid developing countries, so that if widely used, developmental programs relating to crop yields, water management, Green Dam [greenbelts], or sand surveys can take off from there, with ground truth verification as an educational process from which interpretation through detailed cartography can proceed.

Although he himself is proficient in the use of software for image processing, he acknowledges that there is need for educational emphases to accelerate the progress made in the field of general scientific knowledge that has characterized the rather spectacular growth of education in Algeria since independence. Already there is evidence that a new generation of young Algerians who represent 60 percent of the overall population is determined to take advantage of the free higher education which the country offers, particularly in the sciences.

Rachid called attention to the fact that Algeria last year had celebrated 20 years of independence, and we shared pleasure at the steady improvement of relations between our two countries. Nevertheless, with a population of approximately 20 million — *and doubling every generation,* it is apparent that Algeria has much to do in underwriting its commitment to use responsibly the technologies that will make it possible for the country to go forward confidently into the twenty-first century. Preservation as well as development of its 920,000 square miles of territory — approximately four-fifths desert with only 12 percent of the land on which over 90 percent of the population lives, arable — will require great concentration on desert development technologies so that when the oil and natural gas on which some of the present economy is based is depleted, there will be other resources to sustain the country in future. Algerian citrus exports, and more especially Algerian wine exports, for

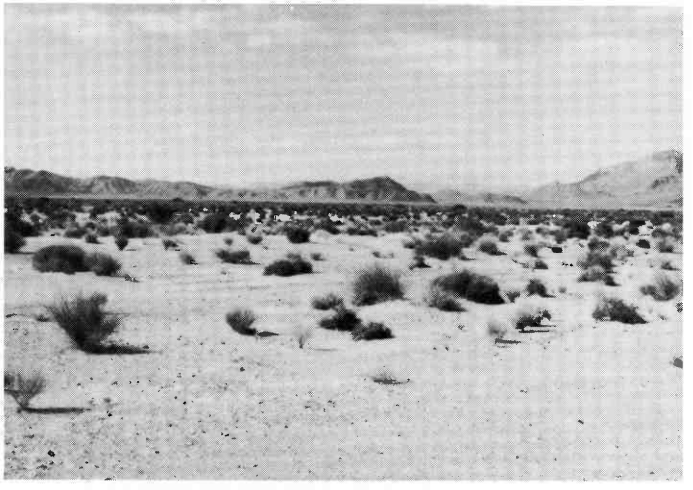
example, are already sought after in the developed world, but the country's determination to be independent to the greatest degree of food *imports* to feed its people, is paramount.

Already sensitized to water scarcity by reason of his having been born in the Saharan Atlas, Rachid is bright enough to be able to split his interests between 'out there' in space and 'down here,' as he foresees the application of his remote sensing background to water management. His course work here in hydrology and watershed management has provided him opportunities to recognize the common problems that face the world's arid lands wherever they be. The 132 years of French colonial rule, and the later near decade of revolution that ended that rule, created a scarcity of environmental data, but Rachid insists that is now overcome by a recognition of the need for data and more data, and still more data. He wants to be part of the team that collects, interprets, and applies that data to his country's needs.

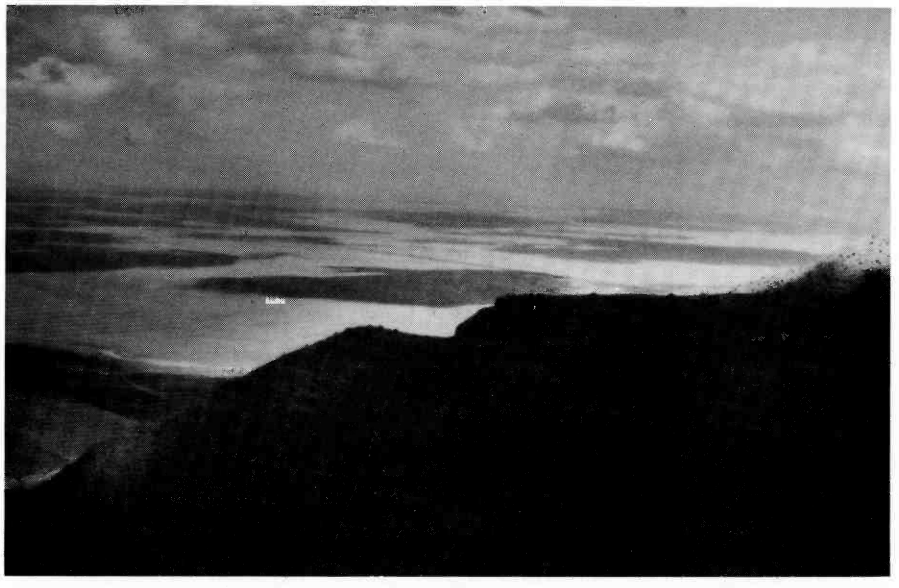
Speaking of data! we speculated briefly about the data from Columbia's late 1981 space shuttle now being analyzed by the University of Arizona, the U.S. Geological Survey, the Jet Propulsion Laboratory, and the Egyptian Geological Survey and Mining Authority. Rachid said he hoped to be home by the time the August 1984 shuttle flight, whose pathway we hoped would bring it over Algeria, takes off into the wild blue yonder. Our own personal observation is that Algeria will be fortunate in this case if someone like Rachid is on hand to help interpret that mysterious exciting revealing data. Herodotus might even have to rewrite his History to take account of environmental changes that predate his observations by several hundred millenia.

—Patricia Paylore

Oasis Ain Sefra, between Mecharia and Bechar, northwest Algeria near Moroccan border.
—William G. McGinnies



Sandy sebka with mixed shrubs.
—William G. McGinnies



View from mountain near Mecharia.
—William G. McGinnies

Editorially speaking:

RUNNING 'IN PLACE'

As we walked briskly up to a busy intersection and stopped for a red light, we were aware of a young man there, 'running in place' as they say, suitably attired in expensive running shoes with designer label, shorts, a steaming shirt, and sweaty headband. We peered around to get a better look at his face, thinking perhaps we could tactfully inquire why he was 'running in place,' but he looked so intense, actually miserable, that we refrained, waiting instead until we reached our office where we could ask the question in a more intellectual setting.

When we found out, the following analogy immediately came to mind:

- Are the international bodies that have been talking for over a decade now about programs, plans of action, studies, investigations, surveys, just 'running in place'?
- Are they doing so simply in order to keep their organizations, companies, consortia, institutions, agencies intact while they wait for some as yet unseen signal to move out toward their goals?
- By intact, meaning their infrastructures, governing boards, supporters, budgets, priorities? or, to keep the analogy intact, their blood pressure, pulse, body temperature, heart rate functioning?
- To back up a bit (without ceasing to 'run in place,' of course), are their goals in need of an infusion of new information, concepts, commitments?

We fret continuously, as all our friends know, about the necessity — more urgent with every rising sun — to move out on the matter of a reduction in population growth to bring it below three percent, and now we ask if holding off on decisions affecting this worldwide crisis by 'running in place' will not hasten the inevitable catastrophe? Will not fewer children mean fewer will starve? Will not fewer children mean fewer will be malnourished? Will not fewer children mean fewer will be illiterate?

We fret perennially about the misplaced emphasis in much of the Third World on capital-intensive technologies introduced supposedly to help provide a better life for those so desperately in need of help rather by way of labor-intensive programs.

We fret day-in and day-out about governmental demands in those areas for cash crops so that food imports to feed those who are growing those cash crops have to be sought by way of unsupported loans, political arrangements, concessions to developed world needs, misplaced values that fail to take account of realities.

We fret incessantly about the incessant talk. Oh yes, how we talk, the best antidote known to action, as Dr. Kassas said bitterly nearly a decade ago.

So, we'll stop talking right now. Anyhow, the light just turned green, so just one more word, to our friend 'running in place,' "Let's go!"

—pp

QUOTE

' . . . A state which dwarfs its men in order that they may be more docile instruments in its hands even for beneficial purposes will find that with small men no great thing can really be accomplished.'

—John Stuart Mill

??? HAVE YOU SEEN ???

Agricultural Newsletter for Arid and Semiarid Areas (v. 1, no. 1, 1981) Published by the Office of the Training and Research Center of Agricultural Techniques in Arid and Semiarid Areas, Northwestern College of Agriculture, Wugong, Shaanxi, China.

Published irregularly in both English and Chinese editions 'to exchange scientific information in this field with related colleges and research units both at home and abroad.' Copies at hand as we go to press included articles on irrigation in arid and semiarid regions in Northwest China, on effective application of self-pressure and sprinkler irrigation systems in arid and semiarid mountain 'yuans' and slope regions, and gravel-sand mulched fields of the area. Also covered are several study tours to the College by FAO/UNDP personnel, tours of Chinese experts to the area's loess plateau, a symposium held at the College of rainfed agriculture in 1982 as well as Chinese experts' attendance at the International Congress on dryland farming held in Australia in 1980. There are news columns, maps, photographs. Exchanges are solicited. Emphasis is placed in the College's Training Center on courses offered during October-September 1981, for instance, to cover 600 technical personnel in cooperation with experts from both home and abroad. Participants were chiefly teachers of institutions of higher learning and secondary agricultural training schools. There are news columns, maps, photographs.

Agarwal, Anil, et al (1981) Water, sanitation, health — for all? Prospects for the International Drinking Water Supply and Sanitation Decade, 1981-90. Earthscan, 10 Percy St., London W1P 0DR. 146 p. £3/$7.

This comprehensive review of the Decade looks at the health and social costs of dirty water, the difficulties in making a water supply program work, health education, sanitation: costs, problems and alternatives; efforts in three countries: India, Colombia, Kenya; the backers of the Decade: who will put up the money? the Decade's goals: can they be reached? As the Decade begins, over half the peoples of the Third World do not have safe water to drink, and three-fourths lack any sanitation at all. Since 80 percent of the world's diseases are linked to unsafe water and poor sanitation, and illness can often drive a poor family into starvation, it is imperative that the Decade begins with an understanding of the factors involved.

Centre for Overseas Pest Research (1982) Report, January 1981-March 1982. Overseas Development Administration, College House, Wrights Lane, W8 5SJ, London, England. 56 p.

Includes information relating to research reports on agricultural pests, disease vectors, pesticide chemistry, environmental studies, training. Arid countries covered include Egypt, India, Kenya, Mali, Somalia, Sudan, Syria, Upper Volta, and Yemen Arab Republic. References included, plus staff listings.

Dresch, Jean (1982) Géographie des régions arides, avec la collaboration de Christiane Motsch. Presses Universitaires de France, Paris. 277 p. (Le Géographe, 30)

Jean Dresch, an acknowledged authority on the evolution of the earth's dry zones, has been writing on arid lands for more than four decades. In this, his latest work, he seeks to synthesize his own views and those of others regarding the processes, both physical and human, that have desertified approximately one-third of the earth's lands. He begins by reviewing the climatic and geomorphologic causes of aridity, moves on to an examination of the variety of plant and animal life forms that have adapted successfully to desert, oasis, and steppe conditions. He follows this discussion with an analysis of the human impact on arid environments. Agriculture, pastoralism, and urbanization each are assigned a role in the desertification process.

Dresch's concluding chapter is more speculative. In it he ponders the consequences of increased global aridity on each of five proposed arid bioclimatic zones:

- flat tropical deserts
- Sahelian arid and semiarid marginal lands
- subtropical Mediterranean arid and semiarid basins and alpine terrain
- cold continental deserts and semiarid steppes
- American arid zones

While acknowledging the marked growth of true deserts and the oasis invasions of dunes, Dresch is more

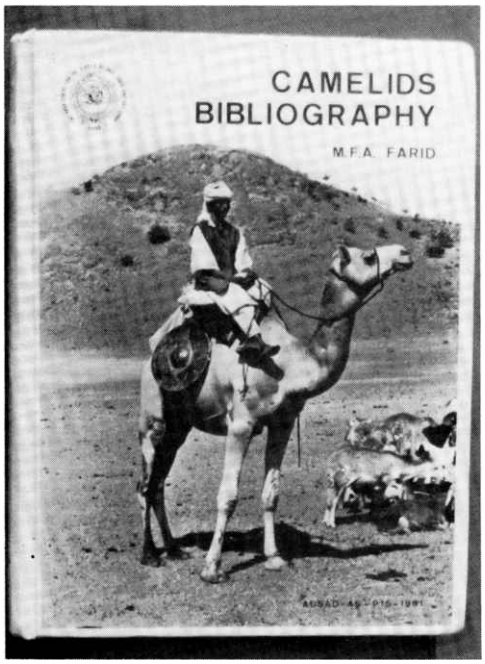
concerned about desertification in more populated areas. This phenomenon in the Sahelian and subtropical Mediterranean steppes, in his estimation, poses a more serious threat to global stability. These areas, therefore, are the logical targets of corrective policies and actions, he argues.

A 12-page bibliography is included, organized by general works, physical geography, and human geography. Maps, illus., figures, index.

—Robert G. Varady

Farid, Mohamed F.A. (1981) Camelids bibliography. Arab Centre for the Studies of Arid Zones and Dry Lands, P.O. Box 2440, Damascus, Syria. 546 p. (ACSAD-AS-P15).

An outgrowth of the 1979 International Camel Workshop, Khartoum, Sudan, this bibliography of 2,539 citations, many with full annotations, was undertaken in support of recommendations of that Workshop calling for coordinated global research if camelids and their productive potential are to be realized. Arranged in alphabetical order by author, there are geographic and subject/species indices, the latter in tabular form: *Camelus dromedarius, Camelus bactrianus, Camelus* spp., S. American Camelids, and unclassified. The geographic breakdown, beyond general and regional studies, is by country, from Afghanistan to Yugoslavia.



Foster, Kennith E., et al (1982) Technology assessment of the commercialization of Mexican guayule. Final report [of] University of Arizona, Office of Arid Lands Studies, Tucson, and Centro de Investigación en Quîmica Aplicada, Saltillo, Coahuila, for National Science Foundation and Consejo Nacional de Ciencia y Tecnologîa, Comisión Nacional de Zonas Aridas. 256 p.

This final report presents the findings of the technology assessment of the commercialization of guayule *(Parthenium argentatum)* as a domestic source of natural rubber for Mexico. It reviews world and Mexican elastomer consumption and production, technical data on Mexican guayule wildstands, harvesting, guayule farming and processing, outlines two possible commercialization scenarios and analyzes potential impacts, reviews prospects for guayule commercialization; and analyzes federal policy related to a potential guayule industry. Tables, figures, maps, glossary, references.

Golany, Gideon, ed. (1982) Desert planning: International lessons. Architectural Press, London; Nichols Publishing Co., N.Y. 164 p. ISBN 0 85139 1532 (British ed.); ISBN 0-89397-119-7 (U.S. ed.).

Fourteen chapters, each written by a specialist in the field, combine theory with practical advice: defining problems, highlighting existing solutions, and introducing alternatives. Conclusions indicate lessons learned from past experience, with recommendations for the future. Urban Planning and Design, pt. 1, includes case studies from Western Australia, Israel, Turkey; Energy and Water Resources, pt. 2, covers Land use and energy conservation [Tucson, Arizona], and Managing a finite groundwater supply in Arizona's Santa Cruz Basin; Design of Human Shelter, pt. 3, includes case studies from southwestern US Pueblo architecture, Australia, Sudan and Nigeria.

Grainger, Alan (1982) Desertification: How people make deserts, how people can stop and why they don't. Ed. by Jon Tinker. Earthscan, 10 Percy St., London W1P 0DR. 94 p. ISBN 0-905347-37-4. £3 (or $5.50 from Earthscan's U.S. office: 1319 F St., N.W., Washington, D.C. 20004).

As a summarized follow-up from Stockholm [see Earthscan's 'Stockholm Plus Ten — Promises, Promises?') and UNCOD, this paperback asks how the problem has changed, what exactly was the 'Plan of Action,' how much of it has been implemented, and what has happened to the promises, pledges, and forecasts made in 1977. Despite all efforts since 'Stockholm,' the Sahel is once again ripe for disaster. Far too little is being done either there or in the 100 or so other nations affected by desertification to keep good land from going bad. ***Desertification*** examines the reasons: overcultivation, overgrazing, deforestation, and poor irrigation practices. The rich nations, the poor nations, and the international agencies know what needs to be done to stop cropland and pastures turning to desert. Why, it asks angrily, is so little being done? Do not pass over this publication because you are tired of the subject. Read and study it, and renew your commitment to action.

Instituto Brasileiro de Informação em Ciencia e Tecnologia (1982) Bibliografia Brasileiro do semi-árido. IBICT, 70.740 - Brasilia, DF, Brasil. 69 p. No charge.

Over 300 citations in this retrospective listing arranged topically, with author index. Animals, fish, vegetal, irrigation, rural sociology, natural resources, and other topics. Brief list of indexing terms applied to each, but no overall index. No annotations. A separate brochure describes the IBICT's Centro de Informaçã do Semi-Árido which is responsible for the bibliography's compilation and publication.

Le Houérou, Henri N./Popov, G.F. (198- ?) An eco-climatic classification of intertropical Africa. FAO, Rome, Plant Production and Protection Paper 31. 40 p.

This working tool for ecologists and agricultural planners covers most of Africa including a range of climates from desert to hyper-humid, from lowland to highland. Discussion is based on two broad climatic regions: tropical, with a monomodal precipitation regime; and equatorial, with bimodal precipitation subclimates ranging from desert with less than 100mm annual, to hyper-humid with annual of more than 1500 mm. For each, vegetation types, land use, soils, population densities, land distribution, eco-climatic zones, and climatic data for selected intertropical stations are given in tables. In addition, other tables show months in rainy season, annual rainfall, annual potential evapotranspiration (after Penman), and mean and annual temperatures. Ninety-four references.

Schneider, Hans J. (1982) Drought, demography, and destitution: Crisis in the Norte Chico. GeoJournal 6(2): 111-119.

Growing population pressures, limited natural resources, and recurring droughts are thought to be the chief reasons for socioeconomic underdevelopment in the Norte Chico region of Chile (29-33° S). Droughts occur with rather high statistical frequency and in recent decades they appear to have become even more frequent. Depletion of already scant forest resources of the area occurred during the 19th century, when most wood species were used as firewood, charcoal, or fuel for settlements, mines, and smelters. At the same time as agricultural exploitation and mining intensified, increasing sheep and goat herding contributed further to the deterioration of the environment. Out-migration now constitutes a demographic drain from the area, caused not so much by environmental deterioration but the perpetuation of land tenure patterns that stress latifundia/minifundia without allowing for development of independent midsize agricultural establishments. In sum, a typical arid world situation.

Leng, Gunter (1982) Desertification. A bibliography with regional emphasis on Africa. Universität Bremen, Postfach 330 440, 2800 Bremen 33. 177 p. (Bremer Beiträge zur Geographie u. Raumplanung, hft. 4) ISBN 3-88722-075-7.

The compiler justifies still another desertification bibliography by his belief that at least two 'standard' earlier ones are too general, hence his emphasis on an arrangement that calls for a regionally classified list of scientific publications, reports, and documents. Under West Africa/West African Sahel, for instance, citations are grouped under such headings as land use impacts, climatic factors, biogeophysical feedback; and measures to combat desertification, as well as sections on individual countries. These same groupings are also applied to a shorter list of citations applicable to the worldwide phenomenon of desertification. No annotations, but the arrangements help the user pinpoint his interests.

Symposium on Intercropping in Semi-Arid Areas, 2d, 1980 (1982) Intercropping: Proceeding of the 2nd Symposium . . . Morogoro, Tanzania. Ed. by C.L. Keswani and B.J. Ndunguru. International Development Research Centre, Box 8500, Ottawa, Canada K1G 3H9. 168 p. ISBN 0-88936-318-8.

Results of continuing work at the Faculty of Agriculture, Forestry and Veterinary Science, University of Dar es Salaam, is reported here, together with papers by scientists from 15 countries in Africa and Asia. Intercropping is defined as the mixing or interplanting of a number of different crops on the same piece of land at the same time, a farming practice commonly used by subsistence farmers in the semiarid areas of Africa. The research conducted in this practice is intended to insure that the technology takes account of constraints encountered by farmers, and that recommendations as applied will indeed improve agricultural productivity. Specific studies include the physiology and development of yield, planting schedules, aspects of moisture and nutrient availability, and the potential for including trees as intercrops with food crops.

Waterlines, v. 1, no. 1, July 1982 Intermediate Technology Publications, Ltd., 9 King Street, London WC2 8HN, England. Subscriptions: £7 ($14) for individuals, £8 ($16) for organizations. ISSN 0262 8104.

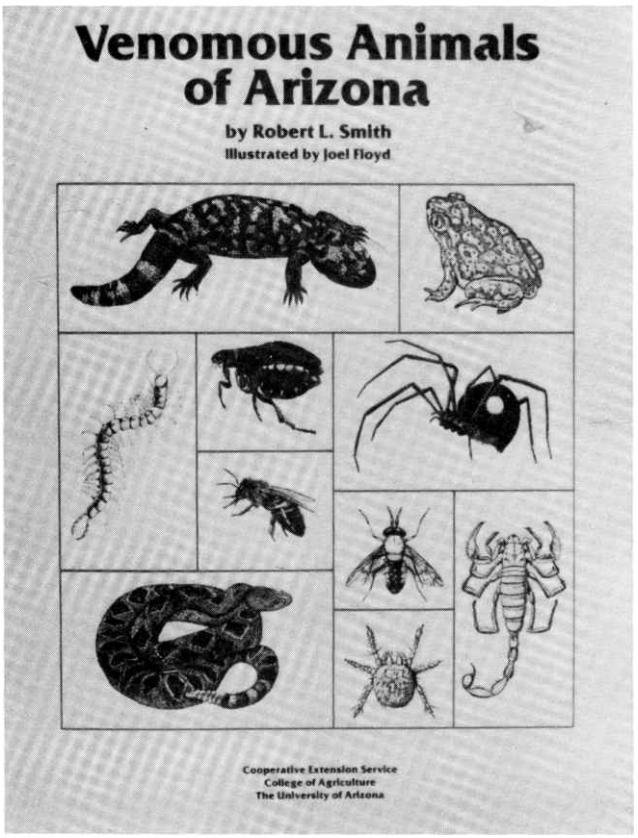
A new quarterly journal 'of appropriate water supply and sanitation technologies.' Articles in the first issue include such topics as A Simple Method of Jetting Tubewells, Freeing the Blue Nile from Bilharzia, the SWS Sand Filter and Pump, Rainwater Harvesting, Water Collection from Thatch. Editorially Martin Beyer, UNICEF, urges that work be 'intensified in providing encouragement to the communities to organize themselves for self-help, and the necessary education to do this. In this context, the exchange of ideas for practical, low-cost water and sanitation projects is of paramount importance. Most of the work can — and will have to —be done using simple methods and local resources.'

Smith, Robert L. (1982) Venomous animals of Arizona. Illustrated by Joel Floyd. University of Arizona, College of Agriculture, Cooperative Extension Service Bulletin 8245. Tucson, Arizona 85721. 134 p. $5.00 +$1.50 mailing (in US).

This excellent book provides not only up-to-date clearly presented information about the handling of Arizona's venomous animals, without once stooping to the 'fearmonger' writing that frequently characterizes information about them, but also delightful insights into their appearance, behavior, ecological roles, and evolution. The book's attractive format features beautiful black-and-white illustrations of the animals, and details of their anatomy. Smith's broad definition encompasses all species or groups that produce substances potentially injurious to people, or those that are 'strange or fierce' looking: scorpions, pseudoscorpions, whipscorpions, solpugids, spiders, mites and ticks, centipedes and millipedes, lice, thrips, bugs, beetles, stinging caterpillars, flies, fleas, ants, wasps, bees, toads, lizards, snakes, and skunks.

Discussions of species/groups presenting life-threatening hazards are initiated by warning paragraphs printed in red ink. All species/groups receive careful treatment in terms of:

- description (including each species in Arizona if applicable)
- biology (often providing a rationale for control measures)
- envenomation (clear descriptions of known reactions)
- treatment (including simple and inexpensive remedies where appropriate), and
- precautions and control (avoidance of conditions that may lead to envenomation and ecologically sane measures for reducing populations of venomous animals if advisable)



In addition to the main discussion organized taxonomically, special sections include:

- some questions and answers about envenomation
- dangerous venomous species and emergency procedures for envenomation
- aids and techniques
- medic alert and the envelope of life
- glossary
- selected references
- sources for assistance with venomous animal problems, and
- medical management of bites and stings, written for physicians by Donald B. Kunkel, M.D.

This is an important book for anyone who frequents the out-of-doors or is concerned about handling problems of envenomation. Smith is careful to warn against first aid practices no longer considered beneficial (and may be harmful), and instructs his readers on information to be collected that will assist medical/scientific personnel in prescribing treatment.

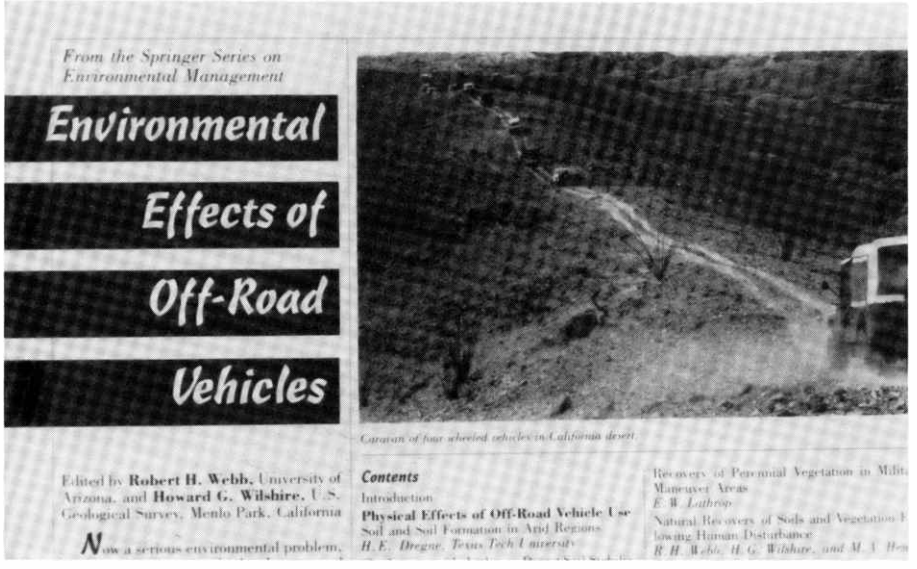
From beginning to end the author lends his personal touch to this book through experiences that bring the lives of these animals into fascinating perspective. Ever aware of their greater role in ecosystem dynamics, he does not hesitate to point out when it is not possible or desirable to 'control' a creature. A behaviorist himself, Smith has polished the gems of behavioral knowledge concerning the lives of these animals for the readers with prose that is assured to elicit respect. An evolutionary understanding of his subjects is clearly presented, and stages in the development of venom mechanisms are hypothesized.

Smith's own enjoyment of his subject comes through constantly, perhaps most clearly in speculations on adaptive significance of behaviors. His probing into the lives of venomous animals makes this book much more than a handbook for dealing with problem animals. It certainly will fulfill his objective of reducing 'the incidence and severity of human suffering (both physical and psychological) caused by venomous creatures in Arizona.'

—Wade C. Sherbrooke

Webb, Robert H./Howard G. Wilshire (1982) Environmental effects of off-road vehicles. Springer-Verlag New York, Inc., 175 Fifth Ave., N.Y. 10010. 450 p. 145 illus. $49.80

Now a serious environmental problem, the use of ORVs has caused extensive damage to parks and wilderness areas throughout the world. This new volume in Springer's Series on Environmental Management presents the physical and biological effects of ORVs on arid-land ecological systems, including soils, vegetation, and wildlife. Written by experienced environmental scientists who clearly recognize the severity of the damage caused by recreational, mining, and military vehicles and the loss of choice for future users of the land, it offers practical solutions through actual case studies of planning measures taken to substantially reduce the adverse impacts of ORVs, methods used to rehabilitate the physical systems and vegetative communities of disturbed areas, and management concepts and practices employed in protecting susceptible areas, including regulations, funding, and education.



SIXTY-TWO YEARS AGO

'Godellah Abul Elt Godellan and Mohammet Ali el Keleni have just arrived from Egypt and entered the Agricultural College at the University of Arizona. They were sent here by the Egyptian Government to enable them to become acquainted with our conditions and to study our methods of agriculture. They are picked graduates from the Higher School of Agriculture, Giza.

'Much of their work there was studied in Arabic, their mother tongue, though they speak English well. Gadellah has taught four years in Egyptian schools and has translated several books into Arabic for use in their schools. Upon completing their college education at the University here they will return to Egypt to become members of the Agricultural and Botanical Staff of the Egyptian Government.'

—*Arizona Wildcat,* February 16, 1921

The *Arizona Wildcat* is the name of the University of Arizona students' newspaper, still published under that name. We speculate as to whether these two students were the first to come so far from Egypt, the first to establish the bonds that have held for these sixty-two years. Does anyone in Egypt presently remember either of these two 'students' and can tell us what became of them? We should like very much to know.

—*pp*

MEETINGS, MEETINGS, MEETINGS

June 20-23, 1983: **Guayule Rubber Society Conference, 4th Annual,** University of California, Riverside.

All aspects of research and development related to guayule, *Parthenium argentatum* Gray and relatives will be considered. For contributing papers or further information:

Contact: Conference Chairman, Guayule Rubber Society, Department of Botany and Plant Sciences, UCR, Riverside, California 92521.

July 13-15, 1983: **International Symposium on State-of-the-Art Control of Salinity,** Marriott Hotel, Salt Lake City, Utah.

Objectives: to summarize the state-of-the-art of salinity control in river systems in semiarid areas and to further the interchange of information. Given the diverse nature of the salinity control problem, the Symposium will provide a forum for the discussion of salinity control technologies which involve disciplines such as fluid mechanics, hydrology, hydraulics, agricultural and environmental engineering, geochemistry, chemical engineering, physical chemistry, public policy, soil science, biology. Some topics:

- modeling of salinity processes in river basins
- case studies of salinity control programs
- development of salinity control policy from both domestic and foreign perspectives
- salinity sources and the problems created by salinity

Contact: R.H. French, Water Resources Center, 1500 E. Tropicana Ave., Suite 201, Las Vegas, Nevada 89109. Tel: (702) 798-8882.

August 15-19, 1983: **Renewable Resource Inventories for Monitoring Changes and Trends, an International Conference,** Corvallis, Oregon.

Purpose: to assess current capabilities to inventory, monitor, and to predict trends of renewable resources; to determine where problem areas exist in the implementation of these capabilities; and to make recommendations for research and development of techniques to resolve these difficulties. Some topics:

- selecting attributes with which to measure change
- selecting inventory systems with which to measure change
- inventory methods and implementation
- statistical analysis, implications, and reconciliation
- reporting changes and trends

Contact: Mr. Toby Atterbury, Program Chairman, c/o Crown Zellerbach Corporation, 1500 SW First Ave., Portland, Oregon 97201. Registration fee: $100. Field trips, post-conference tours.

December 18-23, 1983: **Development of the Desert and Sparsely Populated Areas: Policies, Planning, Architecture, and Industry.** 6th World Congress of Engineers and Architects, Tel-Aviv, Israel.

Panels: Environment and conditions, people and communities, water/energy/agriculture, responsive architecture, building/infrastructure/transportation, industry - lifeline for development, advanced technology and energy, telecommunications and information, policies/financing/planning for development.

Originally announced for December 11-16, 1983. Please note new dates.

Contact: International Technical Cooperation Centre, P.O. Box 3082, Tel-Aviv 61030, Israel.

October 20-21, 1983: **Chihuahuan Desert Symposium, 2d,** Alpine, Texas, Sponsored by the Chihuahuan Desert Research Institute and Sul Ross State University.

Objectives: to update knowledge about the Chihuahuan Desert region, identify potential resources and their utilization, to identify changes in the region, and to address new concerns and future outlook. Abstracts of proposed papers pertaining to these objectives must be sent before July 15, 1983, to appropriate Session Chairmen on the following topics:

- botanical biology
- vertebrate biology
- invertebrate biology
- plant resources and agriculture
- archaeology and anthropology
- parks and recreation
- utilization and management of ecological resources

Contact: Dennie Miller, Executive Director, CDRI, Box 1334, Alpine, Texas 79830 (Tel: (915) 837-2475) for details and names of Session Chairmen.

March 19-24, 1984: **International Symposium on Land Subsidence, 3rd,** Venice, Italy. Sponsored by the International Association of Hydrological Sciences and various UN agencies.

Topics on problems of land subsidence due to fluid withdrawal are solicited on legal, socioeconomic, and environmental effects of land subsidence, engineering theory and analysis, karst 'sink-hole' type subsidence, and subsidence due to dewatering or organic deposits or due to application of water (hydrocompaction).

Contact: A. Ivan Johnson, Program Chairman, c/o Woodward-Clyde Consultants, 7600 E. Orchard Rd., Englewood, Colorado 80111.

March 25-29, 1984: **Soil Salinity Under Irrigation - Processes and Management,** International Conference, the Volcani Center, ARO, Bet-Dagan, Israel. Sponsored by the International Society of Soil Science and the Israel Society of Soil Science.

Main topics:

- diagnostic criteria for soil and water salinity
- movement and accumulation of salts in soils
- irrigation management and field salt balance
- chemical reactions and control of soil-physical properties
- reclamation of saline-sodic soils
- drainage for salinity control
- management aspect of crop production under saline stress

Contact: Conference Secretariat, P.O. Box 3054, Tel-Aviv 61030, Israel.

June 18-21, 1984: **Bio-Energy 84, Utilization Today and Strategies for Tomorrow,** World Conference and Exhibition, Gothenburg, Sweden.

Contacts: U.S.-the Bio-Energy Council, Suite 825-A, 1625 Eye St. NW, Washington, D.C. 20006-3190. Tel: (202) 833-5656; Telex 899133 (WHIT-EXPO).

Others - Swedish Bio-Energy Association, Essingestraket 11, S-11266 Stockholm, Sweden. Tel: +46-8-565693.

GROUNDWATER HYDROLOGY SHORT COURSE

Northern Arizona University will offer its second Groundwater Hydrology Short Course in Flagstaff, Arizona, June 6-10, 1983. The course will provide the participants with a basic understanding of the occurrence, movement, recharge, collection, contamination, and protection of groundwater. Land subsidence and fissuring, groundwater law, and current issues will also be discussed. The course is intended for persons in public and private agencies that deal with groundwater, but have not had formal training in groundwater hydrology, for students, and for interested citizens. The course will consist of lectures, demonstrations, worked examples, discussions, and a field trip. The principal lecturer will be Dr. Herman Bouwer, Director, U.S. Water Conservation Laboratory, Phoenix, Arizona, and Adjunct Professor in groundwater hydrology, Arizona State University, Tempe, Arizona.

Contact: Dr. Charles C. Avery, P.O. Box 4098, Northern Arizona University, Flagstaff, Arizona 86011. Tel: (602) 523-4051.

LAND-USE SYSTEMS IN ARID AND SEMIARID REGIONS

An International Arid Lands Research & Development Conference

OCTOBER 21 - 25, 1985

University of Arizona, Tucson, Arizona

sponsored by UNESCO and the University of Arizona, marking 25 years since the conclusion of UNESCO's Arid Lands Major Project, and 100 years since the founding of the University of Arizona

ONE HUNDRED YEARS — one hundred years of institutional, personal, administrative, and legislative dedication to the study of arid lands as exemplified by Arizona's conditions, problems, environment, and development. From its earliest beginnings in the late nineteenth century, the University of Arizona has maintained its traditional and historic commitment to this purpose to make the world's arid lands more habitable and productive and at the same time preserve their unique and historic environment. These objectives, enunciated one hundred years ago, and supported and enhanced during all the intervening decades, seem to us to be worthy of the centennial celebration planned for 1985, in tandem with the marking of UNESCO's twenty-fifth anniversary of the conclusion of its Arid Lands Major Project.

Within the framework of the theme of our contribution to the Centennial, a five-day conference on Land-Use Systems in Arid and Semiarid Regions, we expect to focus on an evolutionary sequence of arid land-use systems. This will include: ***TRADITIONAL SYSTEMS,*** pre-modern, primarily subsistence, many of which exist only in historical or archaeological records; ***TRANSITIONAL SYSTEMS***, those existing subsistence-oriented systems that are strongly influenced by modern cash economies; ***COMMERCIAL SYSTEMS***, those viable land-use systems oriented primarily toward commercial production; and ***INNOVATIVE SYSTEMS***, those ideas for new arid land-use systems that are currently in the experimental or demonstration stages.

This structure of conference organization is designed to integrate the following subsystem components:

- soil and water
- crop/range/forest vegetation
- livestock/wildlife
- energy/fuel
- economics
- human adaptive response

It is the intent of the conference organizers that traditional boundaries — both geographical and disciplinary — be bridged, and that cross-fertilization regarding research problems and innovations occur.

The fifth, concluding day of the Land-Use Systems in Arid and Semiarid Regions Conference is designated as an ***"action day."*** A number of concurrent, small workshop sessions will be organized to allow participants to take advantage of both the human and idea contacts made during the previous four days of system sessions, to develop concept papers for future research: what research participants would like to do next, and with whom they would like to do it. Participants will be invited from specific key, arid-lands research funding institutions for the entire conference, but especially for the fifth-day workshop sessions. This mix of participation by international, inter-disciplinary arid lands researchers and representatives of funding institutions should help assure a match between major trends in arid and semiarid land-use research and program goals of funding sources. A plenary session will conclude the conference wherein tangible research concept papers can provide real evidence for the perennial conference question, "Where do we go from here?"

The University of Arizona itself will be sponsoring year-long events including prestigious musical, art, sports, publications, and television documentaries, as well as other national and international happenings. To bring to our campus the outstanding international arid lands research specialists through such an in-gathering as we envision in our conference will provide the instrument by which the arid world can indeed be changed — for the better.