November 1981

No. 15

ARID LANDS NEWSLETTER

Office of Arid Lands Studies • University of Arizona, Tucson

The short-run economics of conserving arid land resources appear to be almost always unfavorable. When commodity prices are high relative to the farmer's or rancher's operating costs, the return on a production-enhancing investment is invariably greater than the return on a conservation investment. And when commodity prices are relatively low, arid land ranchers and farmers often have to use all their available financial resources to stay solvent. *Economic survival, not conservation, is their prime concern.* For the subsistence rancher or farmer, of course, survival is a permanent preoccupation. Efforts to combat desertification that do not take these economic realities into account will either flounder politically or will cause considerable human hardship.

—David Sheridan
Desertification of the United States
Council on Environmental Quality, 1981, p. 122

COVER: Without air conditioning, swamp coolers, or even electric fans, early Arizona dwellers found simple 'passive' ways to keep cool in the smoking-hot summers. Here is one example of an early 1900s Tucson house showing the porch effect created by deep overhang of roof, plus slatted railing to allow for breeze

—photo by Helen J. Kessler

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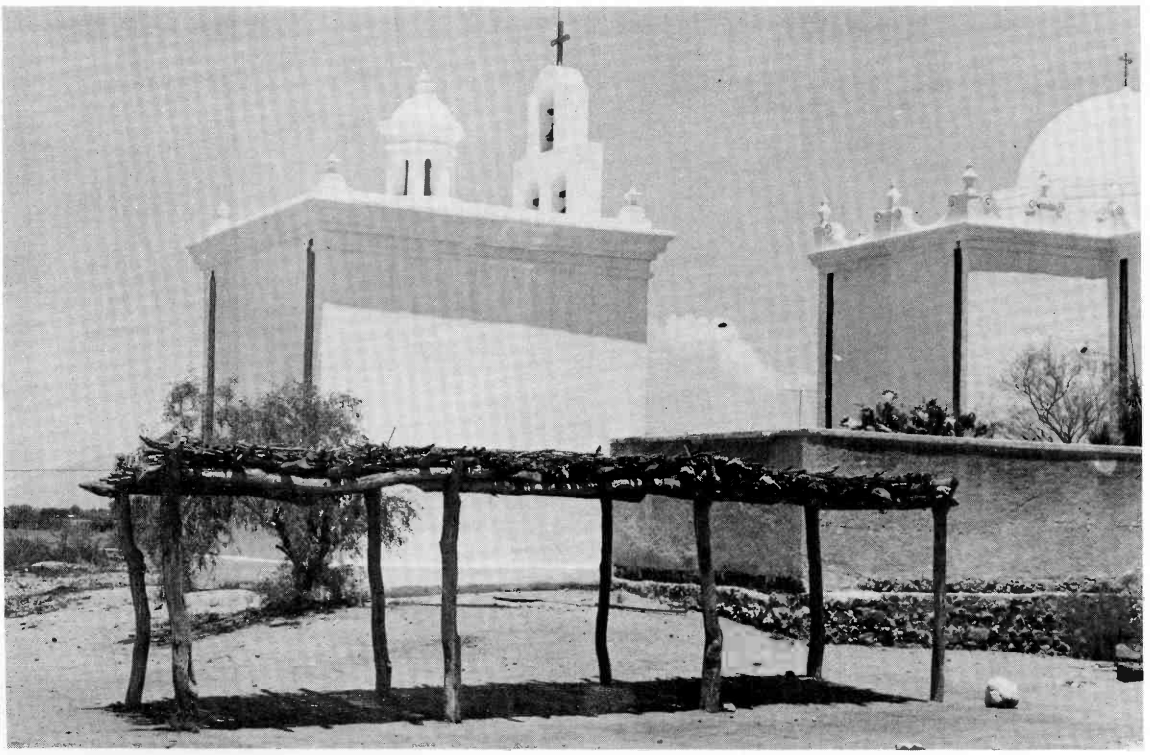

Fig. 1: Ramada, Papago Reservation, San Xavier Mission background.

Fig. 2: Early example of porch effect created by deep overhang.

TRADITIONAL LOW DESERT-SHELTER DESIGN IN THE AMERICAN SOUTHWEST

Helen J. Kessler*
John F. Peck*

INTRODUCTION

'Our building history is a history of solar architecture' (Stein, 1977, p. 23).

For many years people lived in the hot arid regions of the American Southwest without benefit of either mechanical heating or cooling, building their homes instead from local materials which enabled them to cope with climatic extremes. Even though they may not have been as comfortable as we are today, there are nevertheless many cooling concepts to be learned from the early settlers.

Indian Settlements

Some of the earliest known dwellings in southern Arizona were the pit houses constructed by the Hohokam Indians, built partially below ground level to take advantage of the stable earth temperatures and to provide a place for cool air to settle (the thermal diode effect). Above the pit, a structure was built made with mesquite or cottonwood rafters supported by crotched posts. Twigs and reeds laid on the roof were also used to form the walls of the structure, both roof and walls then being covered with mud to provide some degree of insulation (Sobin, 1977, p. 97). This method of construction called *jacal* continued to be used even after the Indians began building homes with entirely mud walls. The *jacal* became the cooking area for families without a wish to build a kitchen inside (West, 1974, p. 117). Smoke escaped through the porous roof, and the main house stayed cooler in summer.

A version of the pit house or *jacal* can still be seen in the *ramada,* built as an adjunct to the high mass adobe homes of the present day Pima and Papago Indians. Since ramadas were usually not attached to the main adobe building, breezes could blow from any direction to cool its inhabitants for increased summer comfort (Fig. 1). Sometimes these Indians built two mud structures close together, covering the area between with a lightweight roof to form a breezeway. On the Papago Reservation near Tucson, this device is still employed and furnishes a relatively comfortable place to sit on the warmest summer days.

In addition to building such pit houses, Pueblo and Salado peoples of the desert southwest also constructed walls entirely of mud. Instead of using blocks, which were not introduced until the Spaniards arrived in the 17th Century, they used a building technique referred to as *pise* or rammed earth, by which a form of interwoven twigs was built, into which mud was puddled to construct the walls. After the mud had dried, the form was moved so that another course could be laid (Nabokov), 1981, p. 7). The great Casa Grande (a deliberate redundancy!) near present-day Coolidge, Arizona, was built using this method. Because the walls needed to be very thick, as much as five feet thick at the bottom for multistoreyed structures and compound walls, they provided a great deal of thermal mass, thus stabilizing the internal temperatures. The flat roofs were built in a manner similar to those of the pit houses.

These mud structures had small doors and either very small or no windows. By keeping openings to a minimum, the building's temperatures would remain quite stable, although ventilation was probably nonexistent, perhaps at that time a minor consideration since people spent much of their time out of doors, working under ramadas during the day, sleeping on their flat roofs at night.

Hispanic Influence

It was the Spaniards who brought with them into the Southwest U.S. the concept of forming mud into adobe bricks for use as walls. Generally built with two withes of 9″x18″x4″ blocks, this method produced a 19″-20″ thick exterior wall, including mud plaster on both sides. Roofs were also mud, built as the Indians had before them. While rooms were small, their size was determined by the length of round logs (*vigas*) available.

A variety of residential floor plans were used, based on a square module. While some buildings had only one, others had a series of modules, often built in stages. Plan forms included two or three in a line, or U-shaped, or a four square shape, or the *zaguan* (or central hall) (Sobin, *op. cit,* p. 102). A module might have both a door and a window on opposite sides. When several were attached in a row, windows between modules were left in place to

* Project Designer and Project Engineer respectively, Environmental Research Laboratory, University of Arizona, Tucson. All photos by Helen J. Kessler.

allow for better ventilation. Because windows were so small, however, and houses were not often built in the direction of the prevailing breezes (southeast-northwest in Tucson, for instance), ventilation probably was not very effective.

A plan which provided for better ventilation was the *zaguan* with its large (often 8-10 foot wide) central hallway. Two adjacent rooms were built off each side of the hall, with transoms installed above the doors from the hall into each room. Depending on whether the building was adjacent to another building, each room had one or two windows. By opening doors on either end of the *zaguan* (often there were operable windows adjacent to doors which could be opened), breezes could ventilate both the hall (which was often used as a living area) and the rooms as well. In effect, the hall thus became a breezeway to help cool the high mass adobe structure at night.

As an example, Julio and Judy Bernal granted Kessler an interview in July 1981 to discuss a building located in Tucson's Barrio Historico which they are currently restoring. It appears to have started out as one or two square modules, with later owners adding a central hall and two more rooms to form a *zaguan* plan. Two reasons for doing this might be assumed:

- the *zaguan* made for a very elegant home where increased privacy was possible since the hall could be used as circulation space to each room
- the *zaguan* plan may have provided greater comfort than the typical square plan could have done

These adobe homes had ceilings about 12'-14' high, making the interior of the rooms an almost perfect cube. Their height provided space for the warmest air to collect, above the occupants' heads. A cloth ceiling or *manta* was often used to help prevent 'fallout' from the mud roof, as well as providing a quasi-attic space that allowed the area to be vented to the outside (Sobin, *op. cit.*, p. 102-106, 114).

The deep reveals of the windows provided some protection from the sun. To lighten the interiors, then, interior walls were painted white or whitewashed to reflect light around. Exterior walls were painted light colors, often white, to reflect the summer sun.

Anglo Influence

When the Anglos first came to the Southwest, they had to build with what was at hand, so their homes and shops were quite similar in plan and form to those of earlier Indians and Hispanic settlers. As soon as dimensioned lumber became available, however, they began making modifications to the adobe structures which actually improved their thermal performance, including putting gable or hipped roofs on top of square and rectangular adobe buildings. The new roof both protected the mud roofs (on existing houses) and provided extra air space which could be vented in summer. Because they were of lower mass than the mud roofs, however, they probably allowed for an increase in the temperature swings of homes built only with wood frames.

Porches were often installed on one or more sides of the building. Not only did the porch provide a protected low mass area for occupants, but it protected the walls from the hot summer sun (Fig. 2, and cover). The earliest porches were left open, but in the early 1900s screened porches became more common. Porches and balconies on multistoreyed buildings were popular places to sleep because they were much cooler than the interior of the high mass rooms which continued to heat up in the evening after a day of sun. Examples of sleeping porches and balconies may still be seen on old hotels which typically had entrances to the balcony from each room. Figure 3 shows a roof porch, open on four sides, on a large Tucson house, probably built in the early 1900s, which may well have been the coolest place to be for much of the day. This particular house also had a basement, fairly common for the period, to take advantage of the cool and stable earth temperatures and provide a refuge from the sun on summer afternoons.

Other European imports included shutters placed on the exterior of windows to keep out the sun's heat. Usually painted a dark green, they had slats mounted on a stick so that they could be opened to let some light in. By their location outside the building, they kept out the sun's heat before it could enter the window, and the heat absorbed by the shutter itself could be dissipated by breezes. Inside even, dark green roller shades were often used in the belief that they kept the interior cooler than white shades would have done.*

Unfortunately, as settlers continued coming west, they brought with them their preferred eastern building styles and materials, not necessarily suitable to the desert climate. Brick houses, with 8" thick walls and no insulation, simply did not have the thermal capacity of adobe. Wood houses were also built, though not in great numbers. Windows were larger and there were more of them, and the large porches which worked so well to shade the adobe buildings often were not included in plans. An exception, however, the so-called Bungalow style common in the early 1900s, did adapt better to the climate, primarily because of its large roof which provided shade and formed a porch across the front of the house (Fig. 4). Screened porches were often added to the back of the house as well.

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* Chonita Sweeney Burrell, interview with HJK, July 1981.

Fig. 3: Tucson house, early 1900s, showing roof porch, open on four sides.

Fig. 4: So-called 'bungalow style' house, Tucson, early 1900s, showing large roof to provide shady open porch.

Lifestyle

Before the luxury of mechanical cooling, it appears that a daily ritual to avoid the summer heat was performed in the American southwest. (Even today there are residents who perform a similar ritual, though not to the same extremes.) Those who lived in thick-walled adobe houses were in the most advantageous position since they could turn to good account the thermal flywheel effect. Each morning as the sun came up, all windows, shutters, and shades were closed. As soon as it became reasonably cool at nights, doors and windows could be opened to take advantage of the cool night breezes to cool down the massive adobe walls. Further cooling could be achieved by hanging wet gunny sacks in windows or doors to gain a measure of evaporative cooling.

It was not an unusual sight to see a whole neighborhood sleeping outside on cots (privacy was not considered a problem). If a bedroll were put out well before bedtime, it could cool down in advance of use. To escape mosquitoes (common in such areas as Phoenix where there are many open irrigation ditches), tents of mosquito netting were constructed. Other devices included burning of cow chips, or dousing the body with oil of citronella. At least one family is recorded as building a canvas tent-like cover that could be rolled up out of the way except when it rained (Fig. 5). Many oldtimers can still relate humorous stories of how these outdoor sleepers coped with the first sprinkle of those occasional summer *chubascos,* a real love-hate concept if there ever was one.

Those who chose not to sleep ouside at night, often slept on screened porches, while those who wanted more privacy used roll-down or canvas shades on double- (or sometimes triple-) hung sash.

Floors of the oldest adobes were dirt, which actually provided another cooling opportunity. One long-time Tucson resident described the nicest room in her family's house — the back kitchen with its dirt floor which they would wet down in the morning. The floor was then swept and covered with a mat. The evaporatively-cooled mass apparently stayed cool most of the day. Patios were also wetted down for cooling.

When the heat became unbearable, which many often thought it always did, the more fortunate ones would head for cooler locations — the ocean or the mountains. Stories ae told of families with means sending 'mothers and children' to cooler places, leaving 'summer bachelors' at home in the city to 'work or play' (Fireman, 1973). This was often quite a disruption of family life, though it provided lucrative business opportunities for the enterprising. A more modest escape from the Phoenix heat was to a campground, built by the City, about thirty miles north of Phoenix called Horsethief Basin.

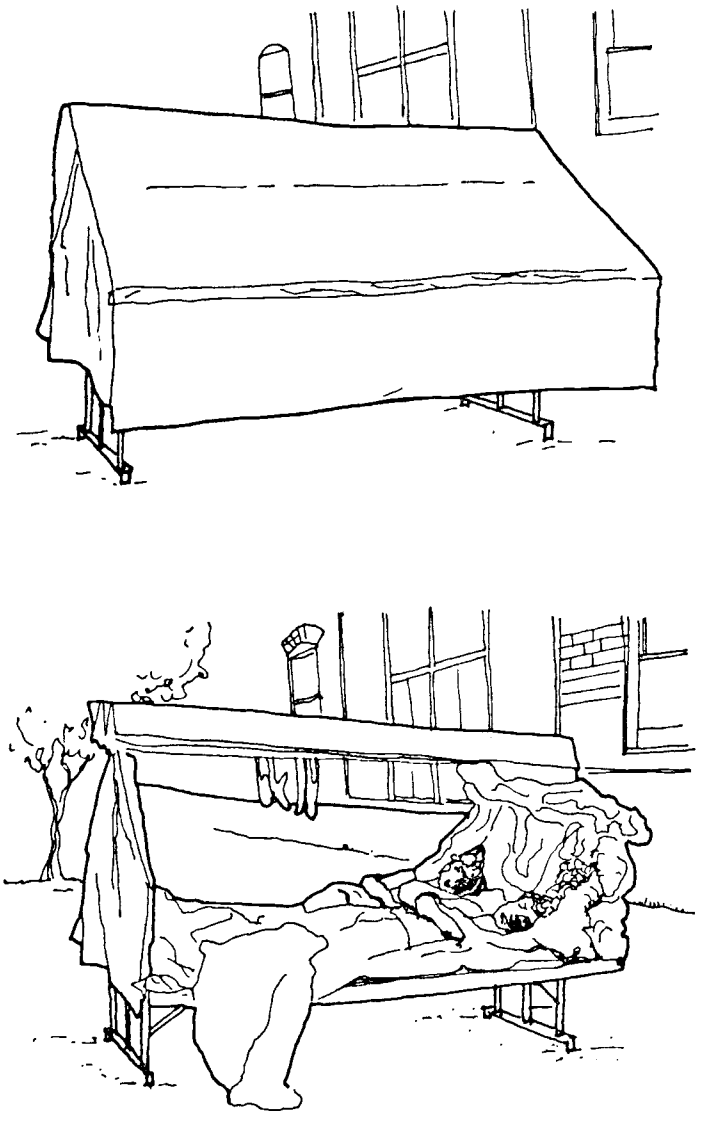

Fig. 5: For sleeping out, one early (1913) Tucson family constructed this tent-like bed covering for rainy nights (above). Below: Removed on clear nights.

—drawing made from photo at Arizona Historical Society, Tucson

In general, life took place out of doors much more than it does today. Even during some daylight hours, people sat outside under trees or ramadas, and one important part of life, still followed in Mexico, Spain, and the Middle East, was the *siesta* during which people napped after lunch during the hottest part of the day, and went back to work in the late afternoon.

LESSONS WE CAN LEARN FROM THE PAST

Mechanical cooling — air conditioners or evaporative coolers — certainly has brought increased comfort to the human species dwelling herein, and concomitantly, it has brought increased numbers of people to the hot desert regions of the American southwest. With the energy situation now confronting us, however, we still have a great opportunity to learn from the early settlers how to be more comfortable while using less energy than we do today.

One of the keys may be our willingness to be more flexible about where to spend our time during the day.

- We may not want to sleep outside on our front lawns, but we could build private roof porches and roof decks on our homes for a place to spend cool evenings
- Like the early settlers with their cots, we could use lightweight furniture, to move from one living space to another as comfort dictates. Furniture which allows one's skin maximum contact with the ambient air is ideal
- During the day the interior of a high mass building, similar to the adobes, will probably be most comfortable, especially when combined with modern techniques for insulating the outside of the walls. Good ventilation is important to allow the massive walls to be cooled down at night
- Painting buildings light colors and shading them, especially windows, is very important. We may not want to use the small windows of the early settlers, but we still need to control the radiant heat coming through them

The basic passive sources of coolth — evaporation, ventilation, earth contact, and night sky cooling — were all used by the Indians and the early European settlers. As energy becomes more expensive, we need to develop a better understanding of those concepts. We are not assuming that mechanical cooling is not needed to maintain our modern concepts of comfort, only that less of it is needed if we only build our houses right. We need to put in perspective the increased availability and sophistication of materials which can be used to increase comfort in hot dry climates.

Besides, as an ace in the hole, there is the extra bonus of knowing that a house built to be comfortable during a hot dry summer will usually be easier to heat in the winter!

ACKNOWLEDGMENTS

We wish to acknowledge the research help of a number of people, including Cynthia Tancer and Ann Barr, as well as a number of Tucson residents who shared with us their experiences in living in a desert climate.

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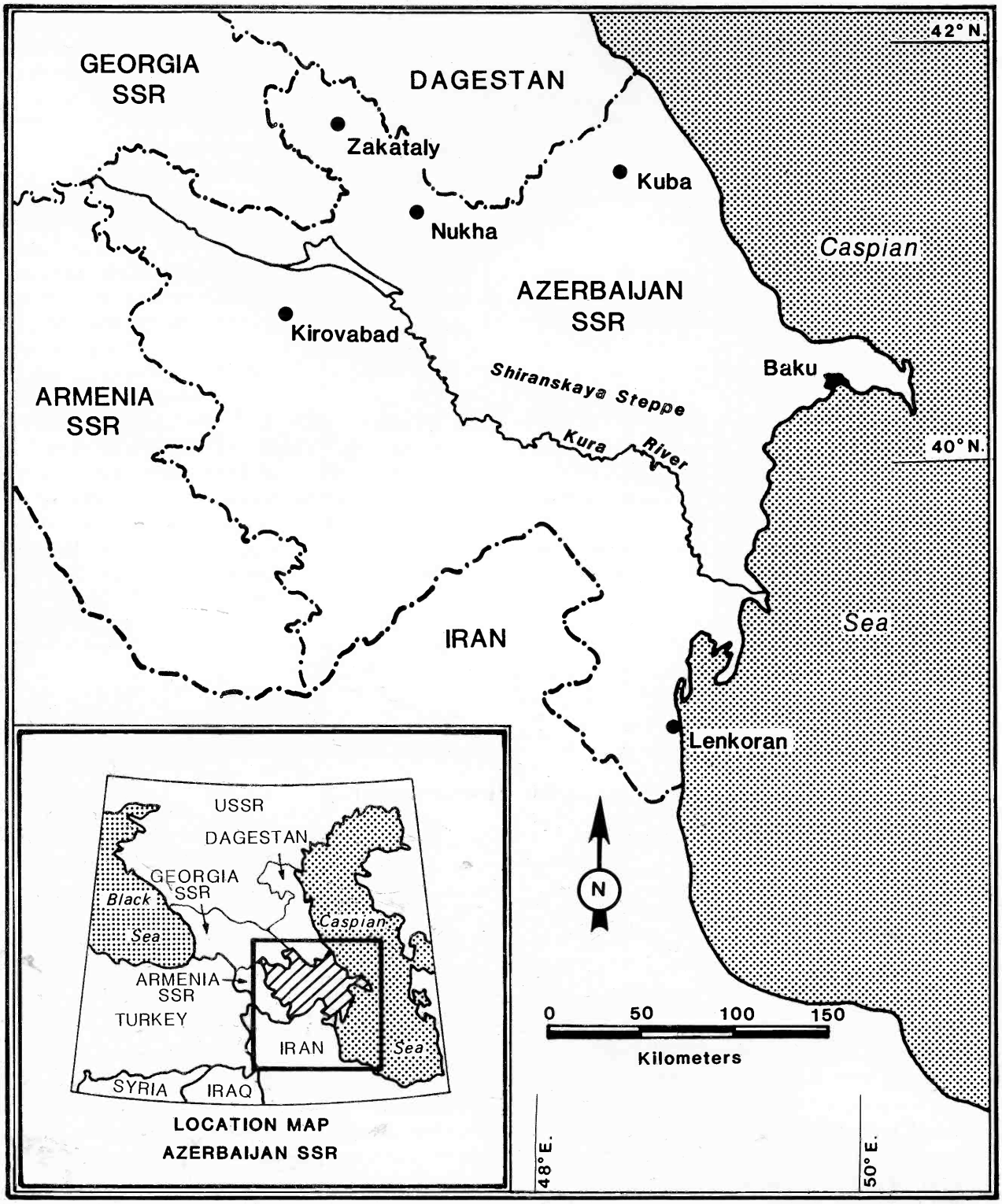

—Cartography by Billie Jo Lobley

ENVIRONMENTAL PROTECTION OF THE ARID ZONE OF THE AZERBAIJAN SSR THROUGH RATIONAL UTILIZATION OF LAND AND WATER RESOURCES

by

H.A. Aliev*

INTRODUCTION

The Azerbaijan SSR, the most eastern republic in Transcaucasus, is situated on the slopes of the Major and Minor Caucasus, Talysh Mountains, and intermontane valleys, at the junction of Europe and Asia, geographically speaking. Since cold northern air currents and warm southern Iranian currents meet in the Caucasus, the desert climate of Middle Asia and the more moderate-humid climate of the Black Sea combine to exert a definite influence on the formation of landscape and its ecological conditions (Fig. 1).

The vertical zonality of landscape causes a diversity of microclimate, brightly expressed throughout Azerbaijan's territory, where altitudes range from -28 to 4,466m above sea level (Fig. 2) and so provide climatic conditions from cold-tundra to subtropic, to dry savanna, to arid sandy deserts, to semideserts. A rich flora and fauna characterizes these tiers, including 6,000 species of flowering plants and as many as 4,100 species of trees and bushes. Here too a number of relic species of flora rarely encountered elsewhere in the world are preserved and protected. Tertiary flora of the Girkan forest, for instance, includes such species as *Parrotia persica, Zelkova hyrcana* A. Grossh., *Quercus castaneaefolia, Albizzia julibris.*, and others. Elsewhere, in the arid zone such as Jeiranchöl, the Eldar pine, only one of a kind, is preserved, as well as pistachio, juniper, ephedra, and others. In the forests of areas with a temperate climate can be found relic species of coniferous yew trees, one of the largest examples being of an age of 2,500 years.

The fauna, too, of Azerbaijan Republic, is rich and varied, numbering 98 species of mammals (among them Caucasian deer, auroches, chamois, roe, mufflon, gazelle, etc.), some 350 kinds of birds, 90 species of fish, and many reptiles.

Fig. 1: Typical arid foothills of the Transcaucasus.

* Academician, Institute of Geography, Azerbaijan SSR Academy of Sciences, Baku.

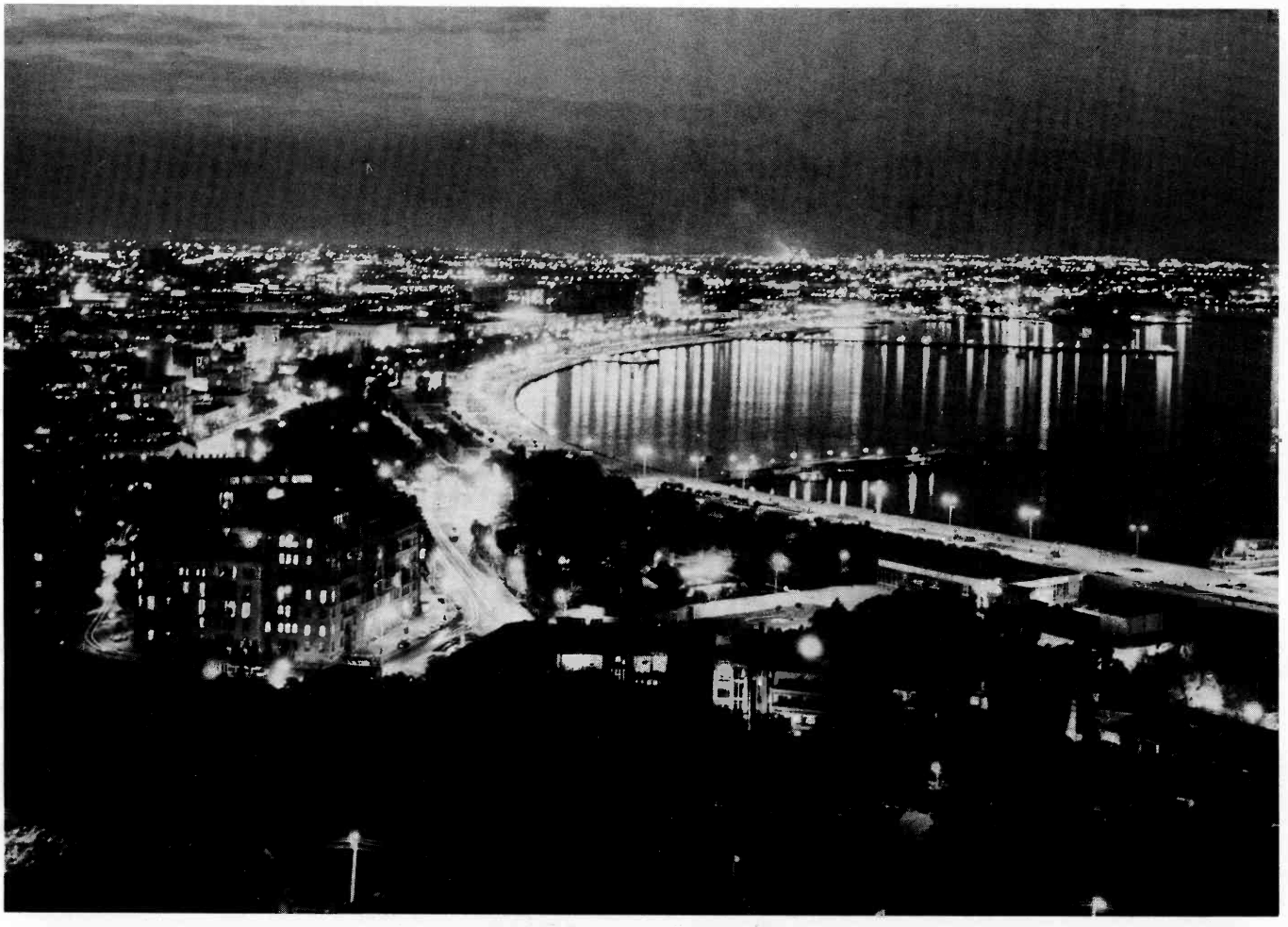

Fig. 2: Baku, capital of Azerbaijan SSR, on the Caspian Sea. The Azerbaijan Academy of Sciences is located on Baku.

—photo by M. Baranauskas, courtesy Embassy of the USSR, Washington, D.C.

CONSERVATION EFFORTS

Following World War I, several reserves were created in the Soviet Union for the protection of rare types of flora and fauna. In Azerbaijan, Kyzylagach State Reservation was founded in 1929 to preserve a waterfowl habitat on the Caspian Sea where millions of birds winter annually, and during the same year Zakataly State Reservation* in the extreme northwestern part of the Republic, occupying the southern macroslope of the central portion of the Major Caucasus, was organized. In 1951, its mandate, to protect the flora and fauna of the area, was enlarged to create a research and cultural/educational organization that continues to keep safe all its natural components. Now, in the latter years of the twentieth century, the central government takes seriously its obligation for the conservation of the environment and the rational use of its natural resources, an obligation characterized by strong exploitation (in the best sense!) of those natural resources concurrently with intensive technical and industrial development.

* For detailed information on this particular reserve, see *The Zakataly State Reservation,* issued (1974) by the State Committee of the Council of Ministers, Azerbaijan SSR on the protection by the Nature [47 p.]. Illus., maps. In Russian and English.

As early as 1950, for instance, the Commission on Conservation of Nature was organized by the Azerbaijan Academy of Sciences, followed fifteen years later by establishment of a State Committee on Conservation, and by the Society on Conservation of Nature. At the present time, Azerbaijan's problems of nature conservancy are handled by this three-pronged effort:

- Scientific research institutes work out problems of land, water, and climatic resource investigations, present recommendations on their protection and rational use
- State Committee controls the purity of the environment
- The Society on Conservation of Nature carries out dissemination of information among the general population, particularly school children and youth organizations; organizes lectures and reports for radio-television and publication; organizes exhibitions and excursions; and exercises control over lawbreakers in the conservancy

The latter also makes suggestions, based on scientific reports, to the Government on the organization of the Reservation, as well as providing statistical data and recommendations for projects that would forward the basic conservation ethnic.

During the period of the last twenty years, eight new reserves have been organized so that at present there are ten state reserves with a total area of 165,000 ha, all biosperhic where scientific investigations according to IBP conventions are taking place. In addition, there are fifteen areas where regeneration of ecosystems is being attempted but where limited hunting is allowed seasonally, and only with special licenses.

Because of its location at the crossroads, as it were, of many historic cultures, Azerbaijan is rich in natural monuments to the passage of time and peoples: relict trees (Fig. 3), animal burial sites as old as 14,000-15,000 years, rock drawings of ancient man, etc., all of which are protected by law.

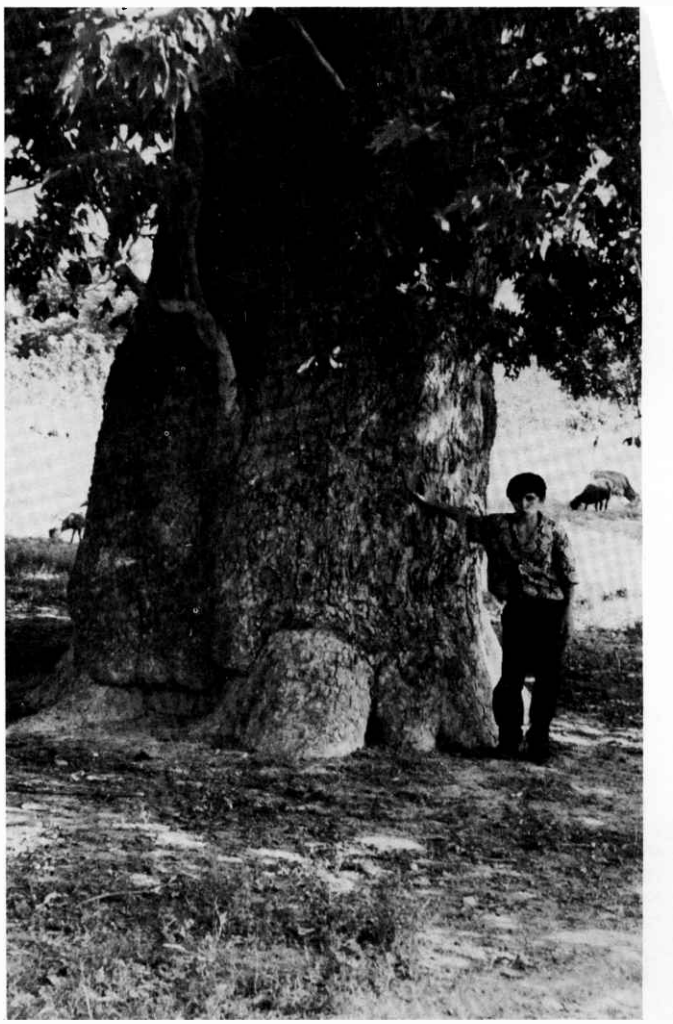

Fig. 3: Ancient plane tree, genius Platanus, commonly called sycamore, or buttonwood.

UTILIZATION OF NATURAL RESOURCES

The main wealth of the Republic resides in its land, water, and thermal resources which supply Azerbaijan's population of over five million with food as well as the raw materials for industry. Even so, according to some estimates, land resources are not fully utilized. Of a total land area of 8.6 million has over 30 percent is arid, 34 percent semiarid, 29 percent moderate-humid, and only 3.3 percent humid-subtropic.

Arid

Thermal resources of the arid zone are quite high, water resources limited. Annual average precipitation is within 250-320 mm, falling to 110-220 mm at the eastern edge of the Republic, largely autumn-winter rainfall. During the growing period of vegetation in this area, atmospheric precipitation does not exceed from 10-20 percent of the annual amount, and during this period evaporation from the soil surface is 1000-1100 mm. In this zone, cotton, along with other suitable crops, is grown under irrigation.

Semiarid

The semiarid zone lies generally in an area from 20-1500 m above sea level where the thermal regime is also quite high, as in the arid zone; annual temperatures average from 10°-12° to 14°; atmospheric precipitation from 350-600 mm, evaporation from 700-1100 mm. Semiarid crops include some cereals, vineyards, and fruit, largely under irrigation, as in the arid zone.

Moderate-Humid

In characterizing this zone, it should be noted that 50 percent is covered with mountainous forests, where water preservation and soil protection have great significance not only locally but especially for the effects on the arid-semiarid areas below. For these purposes, timber cutting is quite limited, and reforestation projects are constantly underway. Annual temperatures average from 0°-12°, atmospheric precipitation from 500-1200 mm. As would be expected, soil surface evaporation is less than atmospheric precipitation due to high air humidity. The mountain forests of this area of the Republic are the source of Azerjaiban's rivers.

Humid-Subtropic

In the humid-subtropic area, where mountain foothills broaden out into valleys, there is a variety of agricultural activity, including silkworm breeding, fruit growing, tobacco, maize, tea (Fig. 4), and vegetables. Despite high thermal resources in this area, and atmospheric precipitation averaging 1400-1600 mm annually, summer irrigation is necessary, particularly for the vegetable and tea plantations.

In sum, therefore, we can see that the Republic's entire agricultural program is irrigation-based.

Fig. 4: Tea plantation on a collective farm.
—photo courtesy Embassy of the USSR, Washington, D.C.

ENVIRONMENTAL POLICIES EMPLOYED IN ALL ZONES

Chemical Pesticides

Industrial wastes have contributed to water pollution and increased mineralization of irrigation water. Accordingly Azerbaijan scientists have proposed to the governments of all the Transcaucasian Republics that no further construction of any facilities that would pollute any sources of fresh water be permitted. The widespread use of chemical pesticides throughout agricultural areas have generated much concern, not only for their effects on water supplies but on useful fauna of the area, including natural enemies of agricultural pests. The Academy's Institute of Zoology, together with the Society on Conservation of Nature have applied their energies and resources to identifying several types of natural enemies of such pests, are now breeding them, and sending them to collective and state farms for release.

Faunal Conservation

The twentieth century has for the most part seen a tragically measurable decline in the number of mammals and birds worldwide, and Azerjaiban is no exception. Much of this may be due to the development of new lands for settlements and agriculture. In Azerjaiban, for instance, the number of jeirans declined after 1930, so that by 1963 there were only 150 accounted for. In recognition of this trend, Academy scientists raised questions relating to a state reserve in the arid zone of eastern Shirvan, including recommendations that hunting be prohibited, to the end that such an area was established to provide opportunity for regeneration of all aspects of its environment. Measures taken subsequently now show an increase of jeirans to 700-800 in the protected area, and as many as 4,500-5,000 in the whole reserve. In the Mino. Caucasus, the number of deer has also increased (Fig. 5).

Even reptiles are protected in Turianchai State Reserve.

THE WHOLE PICTURE

As elsewhere in the arid world, the real issues in the arid zones of Azerbaijan are rational use of water resources and selection of plants for cultivation under these limitations. By taking into account the great number of warm days during a year, we have recommended species of winter fodder, harvesting for silage in late summer, sowing of vetch in early autumn to provide green forage for vitamin/albumen for dairy and younger cattle during winter calving.

In Azerbaijan, especially in the arid and semiarid zones, there are areas in the foothills and midland slopes where artificial irrigation is not possible. Here we have instituted terracing where, due to the accumulation of winter moisture, vineyards thrive and more conventional arid crops such as almond, pistachio, eldar pine, juniper, and others are cultivated, with good results.

All measures that contribute to intensification of agriculture, gradual development of arid areas, application of vegetational methods to prevent soil erosion in highlands, amelioration and regeneration of salinized lands, and the discontinuance of chemical pesticides in favor of biological methods, are being successfully pursued through the three-pronged approach of Azerbaijan's scientific community in collaboration with government and public education.

Fig. 5: Deer in Minor Caucasus.

BUFFALO GOURD FOR BREAKFAST, ANYONE?

Since we first published the article on *Cucurbita foetidissima* (*Arid Lands Newsletter* No. 8, June 1978, p. 1-7), research has gone forward at the University of Arizona in possible uses for the products of this versatile plant, including an interesting student project undertaken by a graduating senior named John Corrin who invited a test panel of twelve North African students, Corrin's professors [the authors of the article mentioned above: William Bemis, James Berry, and Charles Weber], and the local press, to sample his version of a porridge concocted from Buffalo Gourd seeds, one batch with raw seeds, the other with toasted.

Here is Corrin, right, serving a portion to Yassin El-Hassan, a student from the Sudan who is recording his evaluation of its palatibility. Far left is Daniel Djelardje, a government official from Chad.

—photo by James Davis, reprinted by permission of Arizona Daily Star.

A consensus was reached that it was bland but edible. A little seasoning, it was agreed, would brighten the taste. It was also agreed that the roasted seed sample was much preferred over the raw. Corrin himself is convinced that such a food crop as this cucurbit would help diversify agriculture in the Sahel, and his investigations before he undertook the porridge project into such aspects as the Sahel's nutritional needs, common foods of the area, and local cooking methods convinced him that it was worth the experiment.

Good try, and good luck!

THE BOYKO RESEARCH CENTER

On September 3, 1981, the Boyko Research Center honoring the late Hugo Boyko (d. 1970), was inaugurated at Beer-Sheva, Israel, as a component of the Ben-Gurion University of the Negev, its Research and Development Authority, and the Institute for Applied Research. Boyko's widow, Elizabeth, who shared her husband's interest in saline irrigation and water purification interests, hopes that the new Research Center will continue and promote their work on a worldwide basis.

Here are some representative publications that illustrate those interests:

Boyko, H. 1931 Ein beitrag zur oekologie von Cynodon dactylon Pers und Astralagus exscapus L. Akademie der Wissenschaften, Wien, Mathematisch-Naturwissenschaften Klasse, Sitzungsberichte, ser. 1, 140 (9/10).
The groundwater relations of many plant species and plant communities of the salt- and sand-steppes east of the Neusiedler Lake are presented by maps and graphs.

_____ 1934 Die vegetationsverhaeltnisse in seewinkel. Versuch einer pflanzen-soziologischen monographie des sand- und salzteppengebietes oestlich vom Neusiedler See, II. Botanisches Zentrallblatt, Beihefte, ser. 2, 51:600-747.
Contains a detailed description of ecological conditions and their relation to the plant communities and their succession for this region.

_____ 1946 Plant sociological map of 1:50,000 of the catchment areas between Atlit and Zichron Ja'acov (Central and west Carmel). Ministry of Agriculture, Jerusalem, Department of Ecology.

_____ 1946-1947 Checklist of woody plants in Palestine. Imperial Forestry Bureau, Oxford. 65 p.
A complete compilation of all woody species (described up to 1946) of the region now comprising Israel, Jordan, and the Gaza Strip. It includes also those few nonwoody species (such as the annuals *Centaurea hyalolepis* and *Centaurea calcitrapa)* occurring in masses as ruderals and used as fuel by the Arabs and Bedouin, thus diminishing the danger of eradication of the woody plants.

_____ 1947*a* On the role of plants as quantitative climate indicators and the geo-ecological law of distribution. Journal of Ecology 35 (1-2):138-157.
The decisive influence of the IE-factor (Insolation-Exposure) is discussed on the basis of plantsociological records in the Judean desert and of microclimatic measurements. The results are used as proofs of the "Geo-ecological Law" of plant distribution. This natural law reads in its shortened version: "Micro-distribution of plants is a parallel function of their Macro-distribution, determined by the same ecological amplitudes."

1946*b* Science and erosion problems in the Middle East. Middle East Society, Journal 1 (3):82-101.
New ecological methods of studying and measuring erosion in the semiarid and arid areas of the Middle East as well as counteractions against its dangers are discussed.

Boyko, H. 1948 Postwar situation of plantsociological research in Palestine. Vegetatio 1 (1):74-75.
A very brief review of phytosociological research in postwar Palestine, which names the principal researchers and centers of activity including Hebrew University, the Agricultural Research Station of the Jewish Agency in Rehovot, and the government. BA 25 (2) 3799.

_____ 1949*a* On the climax-vegetation of the Negev with special reference to arid pasture-problems. Palestine Journal of Botany, Rehovot Series 7 (1/2):17-35.
Discusses both semiarid and arid communities. Genuine desert vegetation is characterized by *Haloxylon salicornicum.* Severe overgrazing during many centuries accounts for the current dominance of the most abundant species in southern Israel. Attempts to set up a biological sacle of degrees of aridity by plant indicators. Pasture problems are dealt with from various points of view and problems of rehabilitation of half-desert areas are discussed. BA 25 (9) 26398.

_____ 1949*b* On climatic extremes as decisive factors for plant distribution. Palestine Journal of Botany, Rehovot Series. 7:41-52.
Discusses the fluctuations of annual plant populations due to variations of precipitation. The intensity and frequency of extreme climatic factors was found to be important in the interpretation of fluctuations in plant populations. BA 25 (9) 26399.

_____ 1951 On regeneration problems of the vegetation in arid zones. International Union of Biological Sciences, ser. B, Colloquia 9:62-80.
Describes new methods for obtaining plant indicators for determining climatic factors.

_____ 1952 Ecological land use map of the central and southern Negev. Ministry of Agriculture, Jerusalem, Department of Ecology.

_____ 1953 Ecological solutions of some hydrological and hydroengineering problems. *In* Proceedings of Ankara Symposium on arid zone hydrology. Unesco, Paris. Arid Zone Programme 2:247-254.
Outlines for ingenious methods that may be used to indicate climatic conditions, and discusses indicators of depth of water and of water table lowering. Includes information of value to both ecologists and hydrologists.

_____ 1954 A new plant-geographical subdivision of Israel (as an example for Southwest Asia). Vegetatio: Acta Geobotanica 5-6:309-318.
Israel and Southwest Asia are discussed as including parts of five principal plant-geographical belts, including the desert belt as one of the five. The desert belt itself is subdivided into the Central Asiatic or Turanian desert-region, characterized by *Haloxylon persicum* (Saxaul), and the Sahara-Sindic desert-region, characterized by the more thermophilous *Haloxylon salicornicum,* both overlapping in Israel.

_____ 1955*a* Climatic, ecoclimatic, and hydrological influence on vegetation. *In* Plant ecology, proceedings of the Montpellier symposium. Unesco, Paris. Arid Zone Research 5:41-48.

_____ 1955*b* Iran, Israel and Turkey. *In* Plant ecology, reviews of research. Unesco, Paris. Arid Zone Research 6:40-76.

A general discussion of the vegetation of Iran, Israel, and Turkey, with an almost complete bibliography for the countries up to 1952. Attached in a folder is also a schematic geobotanical map showing the pattern of vegetation in Southwest Asia.

_____ 1962 Old and new principles of phytobiological climate classification. Biometerology 1:113-127.

After an historical review on the climatic concept since ancient times, a climatic classification is aimed at by biological yardsticks. Thus in the Negev we can find a region with an *Artemisia herba-alba* climate, another with a *Zygophyllum dumosum* climate, and, in its southernmost part, one with a *Haloxylon salicornicum* climate, all very distinctively different from one another.

Boyko, H. (ed) 1966*a* Salinity and aridity, new approaches to old problems. W. Junk, The Hague. 408 p. (Monographiae Biologicae 16)

Apart from numerous descriptions and ecological discussions of very different arid and/or saline areas the book presents a great number of new principles and methods of how to productivize the sandy and salty deserts of our globe. Boyko's own extensive contributions and those of the other contributors, particularly those of Raheja and Meijering, are also very rich in bibliographical information. Altogether 646 books and papers are referred to and with a few overlappings only, all dealings with deserts or aridity and salinity problems respectively.

Boyko, H. 1966*b* Basic ecological principles of plant growing by irrigation with highly saline or sea water. p. 131-200. *In* H. Boyko, ed., Salinity and aridity, new approaches to old problems. W. Junk, The Hague. 408 p. (Monographiae Biologicae 16)

A very thorough review of literature and the experiments of the author on the ecology of plants as related to high salinity in which he discusses the following 15 principles: 1) Quick Percolation, 2) Good Aeration, 3) Easy Solution, 4) Lack of Sodium Adsorption, 5) General Rules, 6) Partial Root Contact, 7) The Viscosity Theory, 8) Subterranean Dew, 9) Biological Desalination, 10) Adaptability to Fluctuating Osmotic Pressure, 11) The Balance of Ionic Environment, 12) Raised Vitality, 13) Microbiological Influences, 14) Global Salt Circulation, 15) The Basic Law of University Balance.

_____ (ed.) 1968 Saline irrigation for agriculture and forestry. Proceedings of an International Symposium on Plantgrowing with highly saline or sea-water, with and without desalination. Rome, 1965. W. Junk, The Hague. 328 p. (World Academy of Art and Science, Publication 4)

Boyko, H. and E. Boyko. 1957 A climate map of the Sinai Peninsula as example of ecological climatography. International Journal of Bioclimatology and Biometerology 1 (2) A. 3 p. 6 figs.

This map has been drawn by the new method of ecological climatography, as an example for other regions. In view of the lack of reliable meteorological data, plant-sociological records and other ecological studies rendered the basic data for it. Graphs explaining the methods are presented in the text accompanying the map.

Boyko, H. and E. Boyko. 1964 Principles and experiments regarding direct irrigation with highly saline and sea water without desalination. New York Academy of Sciences, Transactions, ser. 2, 26:1087-1102.

Boyko, H., E. Boyko, and D. Tsuriel 1957 Ecology of sand dunes. Final Report to the Ford Foundation, Subproject C-le:353-399.

A study of dune vegetation and of the ecology of many single dune species (root systems, evapotranspiration figures, etc.).

Boyko, H., D. Bugoslav, and N. Tadmor. 1957 Pasture research (in the Negev). Final Report to the Ford Foundation, Subproject C-ld:295-356.

A description of the desert and semidesert range in the central part of the Negev, with experiments to raise its grazing value.

Boyko, H. and N. Tadmor. 1954 An arid ecotype of *Dactylis glomerata* L. (Orchard grass) found in the Negev (Israel). Research Council of Israel, Bulletin 4 (3):241-248.

Orchard grass, which normally grows in more humid areas, was found in the central Negev in a region of about 150 mm of rainfall. Additional runoff water was estimated to make the site comparable to one with 250 to 300 mm of rainfall. Even so, the orchard grass specimens were thought to belong to a very drought-resistant ecotype.

Boyko. E. 1952 The building of a desert garden. Royal Horticultural Society, Journal 76:1-8.

The paper describes the successful development of an experimental garden in Eilat in an absolute desert (rainfall less than one inch). Irrigation water used had a fluctuating total salt content from 2000-600 p.p.m., mainly sulphates. About 200 different species were successfully planted

QUOTE

How fair the desert seems to those who hate the meaness of mankind!

—Menander: *Hydria* [Fragment]
(Greek playwright, ca. 321 B.C.)

Editorially speaking:

PLAY IT AGAIN, SAM

" . . . Concern over the availability and management of planet Earth's natural resources has become a worldwide theme as we begin the countdown toward the twenty-first century. An increased awareness is evident on all levels — local, national, international — that the world's natural resource base is both finite and limited, and, in the absence of proper stewardship, susceptible to rapid depletion. From this environmental concern has evolved the global attention now being given those areas where narrowly-conceived development projects have wasted and exhausted the resource, preempted better use of the land, and created serious secondary environmental problems, the costs of which may diminish or actually outweigh anticipated benefits over the long term."

—*Arid Lands Newsletter,* no. 1, March 1975

" . . . What can a man do in a thousand days? Can he change the world? Change a village? Change himself? How much time does a man have to do what he is uniquely equipped to do? A lifetime? Tomorrow? A thousand days?

"These thoughts are present because time seems shorter and shorter as the Earth spins on its axis faster and faster, abstractly speaking. This concept of acceleration perceived or imagined, creates restless scientists, impatient planners and legislators, and dissatisfied citizens — in Arizona or in Mali. The great international organizations talk their way through countless agendas, meetings, conferences, committees. The university teams visit, inspect, make notes, write reports, recommend further studies. The information specialists compile, index, store, retrieve, disseminate. And the people? they work, go their appointed rounds, living numbly in a vacuum, waiting, waiting for something to happen. In places, some things **are** happening: drought, starvation, decimation of herds, failure of crops — and beyond: revolution and anarchy."

—*Arid Lands Newsletter,* no. 2, July 1975

" . . . Historically, man has been ambivalent in his relationships with animals. He has worshipped them, feared them, domesticated them, used and abused them, and now he is in a fair way to exterminating them. . . . Will the technological cruelty that we have cleverly invented protect any of us from the extinction that we have brought about for our fellow creatures? When the deserts' wildlife is gone — pour le sport, or indeed for food — will the deserts be more useful for man's needs, much less his enjoyment? We think not.

"In the twentieth century, our increasing contempt for life, initiated by our overwhelming capacity to destroy life, is bringing closer the day when our world will be despoiled and plundered irrevocably. Today the impala, tomorrow the desert world's wretched humans. What difference?

"So we say angrily and bitterly, without apology, viva la cucaracha!"

—*Arid Lands Newsletter,* no. 4, October 1976

" . . . We have a bad reputation for asking questions to which there are seemingly no answers. Why? we keep asking. Why not, we insist? Must we forever submit to the sense of helplessness in the real world, to a sense of being borne along by events, to a sense of being manipulated by mean-spirited leaders reluctant to surrender the privileges of power, to a sense of being enmeshed in events over which we have no control? We think we do *not* need to submit, and that if we continue to make a tiresome nuisance of ourself by asking embarrassing questions about the wasteland of bureaucracy, the bleak routines of paperwork and 'governmentese' — in whatever language, we can indeed force new strategies to turn old mistakes into new successes."

—*Arid Lands Newsletter,* no. 6, October 1977

" . . . What are the prevailing attitudes that influence decisions relating to the management of water, in Arizona or in the Sahel? Is it not demonstrably true now that the scientific and technical steps we could be taking to bring our water resources into equilibrium with the demands made upon them are on a collision course with economic and political realities? So? we ask irritably, we must be paralyzed? unable to deal with global problems mutually, to create through such a mechanism of understanding not only the imposition of old tried-and-true means of attacking familiar problems but new flexible responses to a world we did indeed make and one to which we owe restitution?

"Certainly the world's water problems might be more readily solved if the urgency to do so could overcome the global investments in missiles, nuclear warheads, tanks, grenades, rifles, stockpiled against imaginary enemies."

—*Arid Lands Newsletter,* no. 9, December 1978

So play it again, Sam, and again.

—*Patricia Paylore*

MEETINGS, MEETINGS, MEETINGS

Association for Arid Lands Studies meets in Denver, Colorado, April 21-24, 1982. Theme: Energy development impacts on arid western US. Contact: Wm. H. Brooks, Office of Arid Lands Studies, University of Arizona.

International Rangeland Congress, 2d, Adelaide, Australia, May 14-18, 1982. Pre- and post-congress tours through areas of special interest within the Australian rangelands will be arranged. Contact: P.J. Joss, CSIRO Division of Land Resources Management, Private Bag, P.O. Deniliquin, 2710, Australia.

GISAF Symposium, Hallein, Austria, May 21-22, 1982. The program will be devoted to 1) the Sahara neolithic, and 2) nomadism in northern Africa since 1950. [GISAF = Gesellschaft f. Interdisziplinaere Sahara-Forschung]. Languages: German, English, French. Papers are invited. Contact: GISAF, P.O. Box 87, A-5400 Hallein, Austria.

Committee on Space Research (COSPAR), Symposium on the study of land transformation processes from space and ground observations, Ottawa, Canada, May 31-June 2, 1982. Sponsored by COSPAR, Scientific Committee on Problems of the Environment (SCOPE), International Astronautical Federation, and UN Environmental Program. Contributed papers solicited that describe the use of space and/or ground observations to study regional land transformation resulting from human activities such as population redistribution, urbanization/industrialization, changes in agriculture/forestry/grassland management, shifts in the approaches to the natural resource utilization; or natural phenomena such as changes in climate, wind, or fluvial processes. Contact: Dr. Robert M. Ragan, Remote Sensing Systems Laboratory, University of Maryland, College Park, MD, 20742, by Jan. 15, 1982.

However:

THERE'S MORE THAN ONE WAY TO GET TOGETHER

With travel/per diem costs escalating, it's just possible that it would be less expensive to come together via satellites to talk about our common arid lands problems. Would you be interested in a telecommunications conference during the coming year? Any ideas? With an increased need to share the issues that plague us all, we should be able somehow to develop unique new ways and technologies for communication. If Dan Rather can sit before his television console and talk face-to-face with Tom Fenton in London, why should we not be able to do the same with our counterparts in Ouagadougou, Sde Boqer, Iquique, the Karakums, Alice Springs, Dharan, or Lop Nor? Why not? Think about it! and let us hear from you.

??? HAVE YOU SEEN ???

Amin, Sayed Hassan (1981) International and legal problems of the Gulf. Menas Press, Ltd., Gallipoli House, Outwell, Wisbech, Cambridgeshire PE14 8TN, England. US $41.25. ISBN 0 906 6559 05 7.

Discusses legal significance of the Gulf as a semi-enclosed sea, rights of passage, implications of the Iran-Iraq conflict, constitutional problems in the Emirates, regional arrangements over pollution and fisheries, and the delimitation of the continental shelf.

Ayerza, Ricardo (1981) El buffel grass: utilidad y manejo de una promisoria gramínea. Editorial Hemisferio Sur S.A., Pasteur 743, Buenos Aires, Argentina. 139 p.

Cenchrus ciliaris, a perennial grass for subtropical-to-tropical moderate-warm regions with summer rains and a long dry season, can last up to a year without rainfall. It is generally sensitive to frost, although there are a few resistant varieties being developed. It has good nutritional values during its vegetative growing period, but these values decrease with ripening. This author believes it is important to keep it short as with all tropical grasses, so as to preserve its nutritional qualities. It is a great volume and medium quality grass, with protein varying from 12 percent during vegetative growth, to 7 percent when in advanced bloom. Dry matter yields may vary, from 31 tons/ha in Puerto Rico, to 20/ha in Queensland. Illus., tables, and an extensive bibliography.

Baltaxe, R. (1980) The application of LANDSAT data to tropical forest surveys. Food and Agriculture Organization of the United Nations, Rome, Swedish Funds-in-Trust for: TF/INT/333 (Swe). 122 p.

Attempts to assess the extent to which Landsat data can be used for the survey of forest areas in the tropics, and to provide basic info. re nature of Landsat data and how it can be used so that forestry personnel without experience in its use will be in a position to judge the appropriateness of the data's application. Includes an overview of the Landsat system, feature extraction from Landsat data, feature identification, examples of application of data as well as examples of the use of digital data.

Benson, Lyman/Darrow, Robert A. (1981) Trees and shrubs of the southwestern deserts. Line drawings by Lucretia Breazeale Hamilton. 3d ed., revised and expanded. University of Arizona Press, Tucson. 416 p. ISBN 0-8165-0591-8. $49.50.

The diversity of trees and shrubs is captured in this comprehensive volume covering the four desert floristic associations found the U.S. southwest: Mojave Desert, Colorado Desert, Arizona Desert, and Chihuahuan Desert. Nearly 500 species are identified, including woody vines, borderline bushes, and plants found mostly outside the deserts but known to occur within its edges. A detailed explanation of plant structure precedes the listing so that the reader can readily learn to recognize distinguishing features of many plants. Distribution maps help locate species, and an abundance of line drawings ensures accurate identification. 95 full-color plates, 424 photographs and drawings, and 252 maps, plus a lengthy index of plant names, both common and scientific.

Berkofsky, L./Faiman, D./Gale, J., eds. (1981) Settling the desert. Institute for Desert Research, Ben-Gurion University of the Negev, Sde Boqer, Israel. Gordon and Breach, London/New York. 280 p. $35.00. 0677 16280 4.

Experts from many fields of desert research review the history of desert settlement and agricultue, as well as the present problems encountered by modern desert settlers. Topics covered include meteorology, sociology, water resources, solar energy, innovative desert agriculture, architecture, and animal science, specifically: Algae production for biomass in arid zones, closed system agriculture, runoff agriculture, the role of nonreplenishable aquifers in development projects in arid regions, ecology as a tool for desert management, economic change among pastoral nomads in the Middle East, desert towns as a social type, etc.

Beudot, Françoise (1981) Eléments de bibliographie sur la sécheresse au Sahel. Mise à jour no. 5, Références 2218-2937. OECD, 94 rue Chardon-Lagache, 75016 Paris, Centre de Développment. 140 p.

This bibliography is a follow-up to the 6 vols. published earlier. The first two inventoried the literature produced immediately after the 1973 disaster, attempting to identify its causes and consequences. Since then four successive updates (1977-1980) have appeared, bringing the total number of citations, including no. 5, to nearly 3,000. Information arrangement includes agriculture, commerce, transport, labor, population, environment, research, and other categories. Geographic and author indexes.

Biswas, M.R./Biswas, A.K./eds. (1980) Desertification: Associated case studies prepared for the United Nations Conference on Desertification. Pergamon Press, 523 p. (Environmental Sciences and Applications, 12). $75.00.

A compilation of nine case studies, three from China, two from the USSR, and one each from Australia, Iran, Israel, and the U.S., examining various ways of combatting the phenomenon, each making the best use of resources most readily available at a particular time and place, and each supposedly successful.

Chao Sung-chiao/Han Chin (1981) Desert lands of China. ICASALS, P.O. Box 4620, Texas Tech University, Lubbock, Texas 79409. $5.00.

An English translation of a two-part study of the arid regions of the PRC, covering 'The sandy deserts and the Gobi, a preliminary study of their origin and evolution,' and 'Large-scale agricultural reclamation in the Tarim Valley and its impact on arid environment.' Maps and tables are used to illustrate wind forces, rainfall levels, land types, and the composition of some desert surfaces. The Tarim River has been a major source of irrigation historically, but reclamation has brought about some adverse impacts, including salinization and desertification. Maps compare underground water levels and mineralization for 1958 and 1973. (ICASALS Newsletter 14 (3):4)

Doornkamp, J.C./Gregory, K.J. (1980) Atlas of drought in Britain 1975-76. Cartographic advisor, A.S. Burn; Foreword by the Rt. Hon. Denis Howell, M.P. Institute of British Geographers, 1 Kensington Gore SW7 2AR, London. 82 p. ISBN 0 901989 31 2. L27.50.

A truly model scientific exposition of an atmospheric phenomenon common to us in the arid lands but unusual elsewhere, this atlas is divided into sections covering 'expression of the drought,' 'impact of the drought,' and 'dimensions of the drought hazard.' There is also a description of the European context of the drought. Experts have contributed briefs on such aspects as rainfall, evaporation and soil moisture deficit, hydrological and geomorphological effects, water balance, and river discharge. Impacts on agriculture, property damage, water demand/supply, industry and commerce are illustrated, as are the other sections, with detailed maps in color, charts, tables, plus extensive references. There is an explanatory index as well. An introductory section on historical perspective and climatic trends is helpful in putting the event cleanly and distinctly in our line of sight.

Duffield, M.F./Jones, W.D. (1981) Plants for dry climates: How to select, grow and enjoy. H.P. Books, P.O. Box 5367, Tucson, Arizona 85703. ISBN 0-89586-042-2. 176 p.

Describes over 300 plant species adapted to growing in warm arid environments, listed in alphabetical order according to botanical name. Each listing includes special design features, uses, disadvantages, and planting and care, as well as details relating to zones such as soil, sun, water, temperature, and maintenance. Illus. in color, with many showing a particular plant in a landscape setting. Tabular information on plant selection, annuals, perennials, and problems caused by poor growing conditions. Glossary of terms.

FAO Forestry Department (1979?) Forestry for rural communities. FAO, Rome. 56 p.

Community forestry here is defined as any situation where rural people depend upon trees and their products, excluding large-scale industrial and other forms of forestry that contribute to communities solely through employment. It introduces a program being carried out by the FAO and supported by the Swedish International Development Authority, directed at increasing the contribution of forestry to improving living conditions of rural poor in developing countries. It discusses wood as a vital energy source, village woodlots, and tree farming, agrisilviculture, silvipasture, and forest cooperatives, with briefs of activities in China, Korea, Indonesia, Thailand, the Sahel, Sudan, Nigeria, Guatemala, and the Philippines.

Food and Agriculture Organization of the United Nations/United Nations Environment Programme (1980) Global environment monitoring system. Pilot project on tropical forest cover monitoring. Benin-Cameroon-Togo, project implementation, methodology, results, and conclusions. FAO, Rome, UN 32/6. 1102-75-005 Project Report No. 4. 99 p. Maps.

Draws on the range of findings in the three countries for a detailed discussion of monitoring procedures and of a range of topics based on the general experience of the project, including assessment of Landsat imagery for the work undertaken, vegetation classification and ecofloristic zonation, staffing, training, as well as outlining a statistical sampling procedure for monitoring and an alternative approach to mapping. Maps for Benin and Togo at a scale of 1:500,000 and for the southern two-thirds of Cameroon at 1:1 million.

Keast, Allen, ed. (1981) Ecological biogeography of Australia. 3 vols. Dr. W. Junk BV, Publishers, P.O. Box 13713, 2501 ES, The Hague, The Netherlands. 2182 p., 3 vols. (Monographiae Biologicae, 41). ISBN 90-6193-092-8. $495.00.

Covers the development of the Australian environment, the flora of Australia, the terrestrial invertebrates

of Australia, biogeography of inland fresh waters, biogeography of poikilothermic vertebrates and homeothermic vertebrates, and the origins and ecology of aboriginal man, summed up in a synthesis by the editor.

Mabbutt, J.A./Berkowicz, S.M., eds. (1980) The threatened drylands; regional and systematic studies of desertification. International Geographical Congress, 24th, Fujinomiya, Japan, 1980, Working Group on Desertification. Pre-Congress Symposium C19. 153 p. Orders: School of Geography, P.O. Box 1, Kensington, NSW 2033, Australia.

This final summation of the Group's work over a period of nearly a decade includes regional papers by world experts on Sudan, southern Africa, the Middle East, the USSR, Rajasthan, China and Mexico, as well as subject papers on pastoralism and desertification, integrated development, monitoring, wind action, and atmospheric circulation. Chairman Mabbutt prefaces the publication with an overview of the Group's work on the nature of desertification, its extent, climate and desertification, its progress, and our perceptions of the phenomenon.

Matlock, W.G. (1981) Realistic planning for arid lands: Natural resource limitations to agricultural development. Harwood Academic Publishers, P.O. Box 786, Cooper Station, New York, N.Y. 10276. 284 p. $59.50 (Advances in desert and arid land technology and development, 2), 3 7186 0051 X.

This book by a well-known international arid land agricultural expert illustrates the concept that the export of high technology from developed to developing countries has failed to consider the social, political, and economic constraints operating in the marginal arid lands where agricultural production is so desperately needed. The author appeals for more realistic planning for agricultural development in view of the limitations of natural resources, and offers a new scenario for dealing with an arid world confronted with increasing needs while at the same time is challenged by diminishing resources of water, energy, land, and capital.

Regan, D.L. (1980) Marine biotechnology and the use of arid zones. Search 11 (11):377-381.

This CSIRO Division of Chemical Technology-sponsored study describes the cultivation of salt-tolerant phytoplankton and other microorganisms possible in an arid sunny coastal land such as found in Australia, and discusses possible commercial applications. Desired organisms may be cultivated by controlling salinity, temperature, nutrients, and concentration of particular ions, as well as the dimensions of the holding area. Examples are Spirulina and Dunaliella for dried algal material to be used as food or as a source of vitamins, pigments, unsaturated fatty acids, and glycerol. Some photoplankters produce pharmacologically useful products such as antibiotics, growth regulators, and others.

Sørensen, B. (1981) Turning to the wind. American Scientist 69 (5):500-508.

Discusses wind technology, wind-fuel systems, wind-hydro combinations, wind storage systems, and wind potential. Points out that immediate development issues are related to the needs of rural communities, where neither large-scale wind nor wind-scale hydropower are relevant at present, but that small-scale wind-energy converters can play an important role in supplying power for lights, appliances, and food preservation, as well as for pumping water for household use and for irrigation.

United National Environment Programme. (1981) Desertification control, no. 4, May 1981. UNEP, Nairobi, Kenya.

This issue includes articles on the Sudan (James Walls), Chile (Seifulaziz Milas), the Negev (J. Schechter), Malta (Salvino Busuttil), women of the desert (Enid Burke), and news briefs from other countries.

Walker, A.S./Robinove, C.J. (1981) Annotated bibliography of remote sensing methods for monitoring desertification. U.S. Geological Survey, Washington, D.C., Circular 851. 25 p. No charge. Apply to 604 S. Pickett St., Alexandria, VA 22304.

This list covers 118 items, with extensive annotations, relating to remote sensing methods that may be applied to desertification studies. Such techniques are valuable for locating, assessing, and monitoring this phenomenon, providing data for a permanent record of the condition of the land in a format that allows changes in land features and condition to be measured. Both satellite and aerial sensing are covered in an arrangement that includes physical, biological, agricultural, and social indicators. The authors' conclusions emphasize that more research is needed on the use of data to identify indicators and how they reflect the processes on the rates of degradation or reclamation, on identifying a base for measuring the process, and on data presentation formats. They conclude that the most efficient approach is to use remote sensing methods to detect areas of desertification or areas where the terrain has changed and to use ground methods to identify the cause of change and the possible remedial actions.

SERIAL/JOURNAL TITLES:

Agricultural Water Management, v. 3, no. 3, March 1981- Elsevier Scientific Publishing Co., P.O. Box 211, 1000 AE Amsterdam, The Netherlands. US $66.50.

Issue examined included articles on trickle irrigation: emitter clogging and other flow problems; simulation of water flow in the soil under subsurface trickle irrigation with water uptake by roots; distribution of water and salt in soil under trickle and pot irrigation regimes.

Earth Shelter Digest & Energy Report, no. 13, Jan./Feb. 1981- Webco Publishing, Inc., 479 Fort Road, St. Paul, MN, 55102. Published bimonthly. $15.00.

Although their map location of earth shelters in North America shows the greatest concentration in the mid-west, somewhat less in the northeast, the fewest appear in the west and southwest. Nevertheless, in the issue examined there was a lengthy article, illustrated, about 'Adobe Mixed with Earth Houses,' location Cerrillos, New Mexico.

Science in China; Science Bulletin These two English language journals, formerly published as *Scientia Sinica* and *Kexue Tongbao* respectively, are now offered through Scientific and Technical Book Services, Ltd., P.O. Box 197, London WC2N 4DE, England, each @ US $180.00 annually, published monthly. Sponsored by the PRC Academy of Science, Beijing.

Journal of Arid Environments, v. 4, 1981- Academic Press, Inc., 24-28 Oval Road, London NW1 7DX, England/111 Fifth Ave., New York, N.Y. 10003. £25.00/ US $73.50.

The arid world is fortunate to have this scholarly journal dedicated exclusively to its physiological, ecological, and geographical problems. Edited by the world-renowned zoologist, Dr. J.L. Cloudsley-Thompson, University of London, the JAE is the scholarly vehicle by which we can keep up with scientific trends in this environment. Not only does it contain a wide-ranging array of articles on contemporary issues relating to aridity, it includes book reviews — honest hard-hitting evaluations — and an annual species index, from *Abies concolor* to *Zygophyllum simplex* and over 600 others in between. Most articles include comprehensive lists of references, and there are numerous drawings, maps, charts, and illustrations. JAE deserves our support as it continues to tell us about the recovery of soils and vegetation in a Mojave Desert area in Nevada, vegetation and bird community characteristics in an Australian arid mountain range, habitat utilization of the dorcas gazelle in a desert saline area, quantification of rainfall and its utilization effeciency in Rajasthan, or the use of remote sensing for an integrated inventory of a semiarid area, these a sampling only of JAE's wide-ranging coverage of our common problems.

UPDATE ON REFORESTATION IN ECUADOR

Our correspondent Mark R. Flippo, Macará, Prov. Leja, Ecuador, has brought us up-to-date on several projects at various stages of completion that relate to reforestation in Ecuador. While the *Eucalyptus saligna* seedling plants have had mixed success, due in part to a dry winter, ant damage, transport problems, etc., planning for a small nursery goes forward, with hopes that program options such as the following can be realized:

.. provide a ready source of firewood
.. provide a future source of income for the community through the sale of wood products
.. provide temporary employment for community members during construction of the nursery
.. provide employment and education for young people chosen to work in the nursery in technical positions
.. instill a conservation ethnic within the community

Experimental plants of 14 exotics in small plantations indicate that several species have promise: *Eycalyptus camaldulenis, E. citriodora, E. sideroxylon,* and *E. tereticornis,* as well as *Acacia arabica* and *Prosopis spicegera.* ALN readers interested in details are encouraged to write directly to Flippo at the above address.

INTERNATIONAL ARID LANDS VISITORS TO UA/OALS

ALGERIA:

Reciprocating a spring visit to Algeria as part of a National Science Foundation team which included OALS's William G. McGinnies, representatives of several Agerian institutions visited the University of Arizona and its Office of Arid Lands Studies in early September as part of a plan to create a cooperative program of arid lands research:

Dr. Lazhar Fellah, Director, University Center of Research Studies and Application

Dr. Ahmed Aidoud, University of Science and Technologies, Research on Terrestrial Biology

Dr. Ramou Sadat, Centre de Recherche sur les Energies Nouvelles

Dr. Mohammed Khouri, Dirctor, National Institute of Agronomy

Mme. Nicole Bounaga, Director, National Center for Arid Zone Research

—The Algerian team visits the USDA's Soil Conservation Service Plant Materials Center, near Tucson. From l. to r.: Mme. Bounaga, Ed Clay (interpreter), Dr. Aidoud, Dr. Sadat (kneedling), Tim Edwards, Dr. Lawrence Edwards (Program Manager, NSF Division of International Programs), and Dr. W.G. McGinnies (OALS).

ENGLAND:

Ms. Mary Cherry, Editor, Farming World, BBC/Radio, June 8, 1981, to tape interview with ALN's Editor

ISRAEL:

Dr. David Wolf, Rector, Ben-Gurion University of the Negev, Beer Sheva, July-August, to collaborate on research with the University of Arizona's Dr. Donald H. White, Chemical Engineering

Dr. Ran Gerson, Institute of Earth Sciences, Hebrew University, Jerusalem, Sept. 18

Dr. Arie S. Issar, Head, Water Resources Unit, Institute for Desert Research, Sde Boqer, October 1, 1981

Dr. Dov Pasternak, Head, Division of Desert Agriculture, Applied Research Institute, Ben-Gurion University of the Negev, Beer Sheva, October 13, 1981

IVORY COAST:

M. Assa Ayemou, Director of Education and Educational Training, Ministry of Agriculture, Abidjan, April 20, 1981, whose visit was sponsored by the African-American Institute [see Mali, below]

JAPAN:

Mr. Lee MacDonald, United Nations University, May 14, 1981

KENYA:

M. Simeon Kanani, Nairobi, July 2, 1981, to meet with OALS Remote Sensing Unit

MALI:

The African-American Institute, Washington, D.C., sponsored a month-long trip by representatives from Mali and the Ivory Coast, including a mid-July visit to the University of Arizona and its Office of Arid Lands Studies:

Mme. Traeore Bintou Banba, President, Regional Women's Union, Sikasso

M. Boubar Bonfing Koite, Cabinet Chief, Ministry of Agriculture, Bamako

M. Alassane Toure, Director, Project Mali/Livestock II, Bamako

SOUTH AFRICA:

Keith Pulvermacher, Cape Town, July 1981, returning a visit earlier by OALS Research Assistant Leslie Rawles to Pulvermacher's jojoba plantation. On his Tucson visit, he visited various jojoba experimental plots, and later flew to several commercial jojoba farms in southwestern Arizona which are collaborating with the University of Arizona in irrigation methods, laser-leveling of fields, etc.

DEFORESTATION/AFFORESTATION IN SUDAN

We promised you in *Arid Lands Newsletter* No. 13 that we would share with you information on other countries relating to these associated problems as it became available to us. Now we are pleased to call your attention to the Sudan, as reported in *Sudan Environment,* vol. 1, no. 3, May 1981. With the permission of *Sudan Environment*'s editor, Dr. M.Tag El Seed, we have summarized a series of vignettes relating to these issues as they are understood there and the measures taken to devise improvements. For further information, write to Dr. El Seed, P.O. Box 321, Khartoum, Sudan.

- Guest Editorial calls attention to the fact that 'increased dependence on locally available wood fuel with few measures to renew that resource is doing the country a great deal of harm'
- an overview points out that 90 percent of Sudanese households use wood as a primary source of energy (10.65 million tons of firewood consumed in 1979/80), 'that the frequent coincidence of deforestation and desertification is no accident, and that population growth in rural areas . . . leads to the destruction of forests and in some cases to the removal of all trees and scrub cover'
- a paper on development of alternative sources of energy includes solar for heating, cooking, and pumping; windmills and wind-driven generators to provide energy to pump water and generate electricity, as well as to create shelterbelts to protect soil and crops; biomass as a renewable source of energy and, when rationally planned, as a means of recycling nutrients to the soil; and finally, promotion of a national afforestation program that would encourage tree-planting at the household level
- a discussion of 'Firewood, Charcoal and Deforestation: What Are The Options?' pleads for improvement in the efficiency of traditional stoves burning firewood (six percent of the energy in the wood actually being effectively used and 90 percent totally wasted)
- a description of investigations into technology, undertaken at the village level, to convert unconsolidated plant material [largely aquatic weeds] into fuel briquettes utilizing a design for a compressor that would be technically simple with its mechanical parts virtually indestructible and whose capital cost could be recovered through production of briquettes in less than a year, or 'that savings incurred through ownership of the machine would be greater than the costs of purchasing alternate fuels; and finally, methods for harvesting the weeds through construction of booms set at an angle to the current which would deflect the material to the shore.'

ANOTHER *ARID LANDS NEWSLETTER* SPECIAL ISSUE UPCOMING

The Spring 1982 issue of *Arid Lands Newsletter* will be a special one on the order of the July 1981 (No. 13) issue, devoted to deforestation/afforestation. The forthcoming issue will focus on:

Arid Lands Research in the Field of Bioenergy

We are sending out this notice now to encourage all readers of *ALN* to respond promptly with briefs on activities ongoing in their countries. Wanted are manuscripts from 4-6 typed pages, with accompanying black-and-white photographs if applicable. Deadline is February 1, 1982.

Topics relating to biomass energy, production, and conversion will be addressed, as well as biomass from wastes and residues. If your entry in the International Bio-Energy Directory, 1981, is pertinent, request should be made of its publisher, the Bio-Energy Council, 1625 Eye Street, N.W., Suite 825-A, Washington, D.C. 20006, U.S.A., for permission to adapt the information therein for this special purpose. In presenting information about your activities, please emphasize the arid lands aspects of your research. Thank you.

Patricia Paylore, editor
Arid Lands Newsletter

ARID LANDS ABSTRACTS

A new monthly abstract journal (January 1980-) is being published by the University of Arizona, Office of Arid Lands Studies, Arid Lands Information Center, and the Commonwealth Agricultural Bureaux (CAB) of the United Kingdom. Each issue contains approximately 400 abstracts of recent literature pertinent to arid lands studies, including geography, earth sciences, agriculture, natural resources, energy resource development, and human systems. Detailed author and subject indexes are carried in each issue, with an annual cumulation. *Arid Lands Abstracts* is available at an annual subscription price of $300.00 US currency. Subscribers to Volume 2 are now eligible for a 40% discount on the price of Volume 1.

By registering a subject profile with the Arid Lands Information Center, interested subscribers may receive monthly batches of pertinent individual abstracts on 3x5 cards, @ 10¢ per card (minimum order of $20/yr.).

In addition to the journal and the card service, *Arid Lands Abstracts* is currently available as a subfile of the CAB file on two bibliographic computer search services in the U.S. (DIALOG and SDC), and on three systems in Europe (DIMDI, ESA, and EURONET). Computer searches can be requested through libraries or information centers with access to any of these systems, or through either of the two publishers of *Arid Lands Abstracts*. Tapes of the entire file are also available.

Document delivery can be provided for personal use only (to comply with recent U.S. copyright legislation) @ 25¢/page.

To send reprints or research papers for inclusion in *Arid Lands Abstracts*, or for further information please write:

Arid Lands Information Center
Office of Arid Lands Studies
University of Arizona
Tucson, Arizona 85719 USA

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