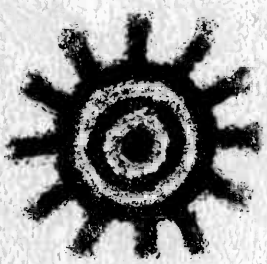

Arid Lands Resource Information Paper No. 3

WORLD DESERTIFICATION : CAUSE AND EFFECT

University of Arizona
OFFICE OF ARID LANDS STUDIES
Tucson, Arizona 85719

1973

Arid Lands Resource Information Paper No. 3

WORLD DESERTIFICATION: CAUSE AND EFFECT

A Literature Review and Annotated Bibliography

by

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OFFICE OF ARID LANDS STUDIES
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CONTENTS

FOREWORD

The Arid Lands Resource Information Paper presented here is the third in a series being prepared for the Water Resources Scientific Information Center (WRSIC) of the U. S. Department of the Interior, Office of Water Resources Research, on Grant No. 14-31-0001-3729, to the University of Arizona, Office of Arid Lands Studies (OALS), Patricia Paylore, Principal Investigator. The first of these Papers, issued in 1972, entitled "Salinity Problems in Arid Lands Irrigation: A Literature Review and Selected Bibliography," is available now only from NTIS as PB-214 172. The second, issued early in 1973, was entitled "Exploration and Exploitation of Geothermal Resources in Arid and Semiarid Lands: A Literature Review and Selected Bibliography," and is available either from OALS, or from NTIS as PB-218 830.

This third Paper particularly has drawn on the extensive arid lands computerized bibliographical resources of the Office of Arid Lands Studies, building since the establishment of the Office itself in 1964. Our tapes now carry full bibliographical information plus abstracts on several thousand prime references, accessible through a controlled Thesaurus of Arid Lands Terminology developed by the Office. The index to the bibliography accompanying this Paper was computer-produced from the keywords assigned to each document appearing in the bibliography.

In addition to the bibliography, cited throughout the text, we have included over 100 additional references in a supplementary author-title list. These carry no abstracts, not because they are secondary citations but rather because other similar references by the same author appear in the bibliography, or because there are other citations in the bibliography that seem to cover the topic adequately. The titles in this supplementary list are sufficiently descriptive to lead an interested user further if he chooses.

While not generally recognized or acknowledged, world desertification appears to be spreading rather than diminishing. Its contemporary visibility derives from a belated acknowledgment of the critical consequences of mis-use, as well as over-use, of natural resources, including water. Arid lands development projects can be a potential contributory to the water depletion process that is a significant cause of desertification. It is our hope that this Paper, documenting the extent, location, causes, and efforts to reverse the trend will be a useful ingredient of understanding upon which solutions must be based. Its compilation should also help resource management recognize the phenomenon, its causes and configuration, and thereby benefit from such already-documented environmental disasters. The problem has

received much publicity relating to foreign countries beset by this gradual and insidious loss of valuable lands and their associated resources, but neither has the United States itself escaped. We think that perception of this environmental issue is the first step toward its solution.

The views expressed are those of Mr. Sherbrooke and myself, and in no way should be construed as the official views of either the U. S. Government or the University of Arizona.

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October 1, 1973

SELECTED WATER RESOURCES ABSTRACTS

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WORLD DESERTIFICATION: CAUSE AND EFFECT. A LITERATURE REVIEW AND ANNOTATED BIBLIOGRAPHY,

Sherbrooke, W. C., and Paylore, P.

University of Arizona, Office of Arid Lands Studies

OWRR 14-31-0001-3729

Arid Lands Resource Information Paper No. 3. 168 p. 252 refs.

An annotated bibliography of 252 references, computer-produced from the University of Arizona's Arid Lands Information System (ALIS), with accompanying text that reviews briefly both cause and effect of this worldwide phenomenon. Causes fall into two categories: long-term (in the geologic sense) climatic change as supported by meteorological, archaeological, geomorphological, vegetational, palynological, and dendrochronological evidence in the literature; and those activities of man's historic occupance of arid and semiarid regions that have contributed to degeneration of marginal lands: agricultural and irrigation practices, grazing, fire, nomadism, and sand stabilization and reforestation. The authors believe that beyond these two categories, there is a third: climatic fluctuation — short-term weather patterns induced by uncertain rainfall and followed by cyclic droughts from which marginal areas may not recover if subjected to continued attempts at intensive use that cannot be sustained by a dry year or a succession of dry years. Insufficient water and attempts to increase water supplies to areas endangered by desertification are problems which must be addressed promptly, but training, education, financing, and cultural adaptations will also be required, probably under international sponsorship. (Paylore-Ariz.)

17a. Descriptors *Deserts, *Droughts, *Bibliographies, Semiarid climates, Arid climates, Arid lands, Weather modification, Agroclimatology, Reforestation, Soil stabilization, Water shortage, Grazing, Burning, Land use, Land management, Conservation, Plant populations, Climatology, Irrigation practices, Carrying capacity

17b. Identifiers *Climatic change, *Desertification, Nomadism

Ø3B

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WASHINGTON, D. C. 20240

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Information Specialists Kathryn Gloyd and Kathleen Bahre of the Office of Arid Lands Studies contributed greatly to the bibliographical chore of verification, to the indexing procedure, and to the library searches for pertinent references.

Systems Analyst Lynn Lybeck was responsible for the successful computer program that responded so well to the complex demands we made upon it. To Mrs. Julie V. Garrettson, in charge of the tedious keypunch operation should go credit for what we hope is nearly-perfect computer copy.

--oOo--

INTRODUCTION

Man's pastoral and agricultural activities in the arid and semiarid regions of the world often have been halted or reversed by the spread of desert-like conditions, herein termed desertification (after the French). While we have chosen to develop from the research effort in this field, as displayed in the accompanying bibliography, the two schools of thought held to be responsible for desertification or desert encroachment, namely 1) long-term (in the geologic sense) climatic change, and 2) the destructive consequences of man's activities, we have also focussed throughout on another concept, climatic fluctuation, short-term weather patterns induced by uncertain rainfall and followed by cyclic droughts from which marginal areas may not recover if subjected to continued attempts at intensive use that cannot be sustained by a dry year or a succession of dry years.

Recent reports (*) from the Sahelian zone immediately south of the Sahara with predictions of massive starvation of human populations and their livestock in this vast desert borderland, illustrate this concept more dramatically than does the scientific literature. But the scientific literature tells the same story — in a "drier" way, perhaps — and not only for this region but for many other parts of the world, for all willing to study it. The intent of this paper, then, is to set forth from this source some of these trains of scientific thinking with the appropriate abstracted references to guide those who wish to read more deeply.

The problem of desertification is recurrent and worldwide (U.S. AID, 1972), desert encroachment in the Karoo of South Africa (Klintworth, 1948), degraded forest areas of Jordan (Atkinson and Beaumont, 1971), desiccation in Asia (Kurkov, 1967; Martinson, 1969; Norin, 1932; Petrov, 1966), the dust bowl in the United States (Sears, 1959), creeping sand dunes in the Rajputana Desert of India (Krishnamurthy, 1952; Roy and Pandey, 1970), and reports of the expansion of the great Sahara (Forbes, 1958; LeHouerou, 1968, 1969, 1970; Monod, 1950; Stebbing, 1935, 1937, 1938c).

(*) Associated Press, July, August, September 1973; Manchester Guardian News Service, July 1973

"Desertification ...," says Grove (1971), "is not easy to define in any language. It involves a laying waste of the land associated with diminishing surface water and increasingly sparse vegetation; a dimunition of usefulness to man and beast, mainly because of reduced plant production."

Either because of climatic fluctuation and resultant droughts, or because of abusive land practices that destroy the ecological balance in these fragile ecosystems, or both, man's utilization of these areas has been seriously impaired by desertification (Achi, 1972; Aubreville, 1949; Boughey, 1960; Miller et al, 1968). This problem was a major topic at a recent international arid lands conference (Dregne, 1969) and also at the 1973 conference in London on "Drought in Africa" [papers not yet available], as well as the subject of worldwide debate for several decades (Collier and Dundas, 1937; Hare, 1961; Jones, 1938; Kassas, 1970; Krishnamurthy, 1952; Kurkov, 1967; Reifenberg, 1953; Sauer, 1955; Stebbing, 1938c; Union of South Africa, 1951; U.S.AID, 1972; White, 1966; Whyte, 1966). Controversy centers not on the fact, now unmistakably visible, but on the causal factors in the spread of desert-like conditions, as theories of long-term climatic change toward increasing aridity vie with cyclic climatic fluctuations and periodic droughts as explanations (Huzayyin, 1955). These in turn are challenged by exhaustive lists of man's environmentally destructive practices, such as poor agricultural methods, irrigation practices, overgrazing, burning, timber cutting, and others (Cloudsley-Thompson, 1971; Kassas, 1970; Lowdermilk, 1935; Pearse, 1970; VanNuffel, 1968). These factors, either singly, jointly, or in combination with climatic factors, are claimed to be responsible for deteriorating conditions apparent in both hemispheres and on every continent.

To deal with a problem of such grave import, now so apparent that it can no longer be ignored, governments have been urged to alleviate the social and economic problems resulting from altered conditions of productivity in the arid zones. Proposals suggested range from settlement of nomads (Mahgoub, 1967; Parsons, 1965), to stabilization of moving sands (Petrov, 1971; Prego et al, 1971), to burning off of brushy rangelands (Humphrey, 1958; Phillips, 1965a), to planting of extensive shelterbelts of trees (Kaul, 1970; Leibundgut, 1955; Liao, 1964; Stebbing, 1935), to altering agricultural and irrigation practices (Aart, 1952; Misra, Prasad, and Bhan 1968; Kruseman, 1968). Before attempting to evaluate the likelihood of success of any of these or other remedial programs, some understanding of the origins of the problem of spread of deserts may be useful.

CLIMATIC CHANGE

Interpretation of long-term climatic changes of a local or global nature is a difficult task (Ambe, 1967; Butzer, 1961, 1966; Fritts el al, 1971; Mitchell and Kiss, 1965; Unesco/WMO, 1963). We know of major climatic shifts in the geologic past (Flint, 1959; Gentilli, 1971; Grove, 1970), and of fluctuations in precipitation resulting in droughts within recorded history (Fritts, 1965; Schulman, 1938). But since scientists are not able to preview future precipitation patterns, they find it a formidable assignment to determine whether a present spread of arid conditions will pass and in future be looked back upon as a drought, or continue and become more severe — in effect initiating a major long-term change in climatic conditions. What they have done is attempt to shed light on the possibilities ahead by establishing a firm understanding of today's climate in terms of the readable recent climatic past (Malde, 1964; Raikes, 1969; Reitan and Green, 1968). This endeavor has required explorations in the fields of history, meteorology, geology, palynology, dendrochronology, archaeology, and biogeography. Modern advanced developments in these fields as they relate to our understanding of climatic change in arid and semiarid regions are worthy of brief consideration.

1. Meteorology. From meteorological studies of general circulation and world climatic patterns, several investigators have concluded that the basic zones of aridity result from worldwide circulation patterns that have not been subject to drastic change for eons (Butzer, 1961; Hare, 1961; Huntington, 1914; Zhakov, 1966). Paleoclimatological evidence for the Pleistocene Epoch suggests that these zones may have shifted north-south, that pluvial periods alternated with interpluvials, and that these may relate in some way to the glacial and interglacial periods of the northern temperate zone (Butzer, 1964, 1966; Butzer and Twidale, 1966; Cloudsley-Thompson, 1971; Dort and Jones, 1970; Martin, 1963; Murray, 1951; Norin, 1932; van Zinderen Bakker, 1966). But the zones themselves have remained intact.

Our most direct evidence of more recent climatic change is from meteorological records. Unfortunately, these seldom extend back much beyond this century, especially in sparsely populated undeveloped deserts. From such records as are available, however, patterns of recurrent fluctuations of precipitation, possibly cyclic in nature, appear to be "normal" for the semiarid regions of these desert borderlands (Gentilli, 1971; Huzayyin, 1955; Huntington, 1914; Raikes, 1969; Thomas, 1963). Yearly

variation in precipitation is so great in many such regions that it is meaningless to speak in terms of monthly or annual means (Reitan and Green, 1968).

2. Archaeology. Archaeologists sift clues of past climates from a number of phenomena such as site abandonment, population increase or decline, and agricultural practices (Butzer, 1959, 1961, 1964, 1966; Butzer and Twidale, 1966; Kelley, 1952; Robbins, 1972; Trousdale, 1967). Small climatic fluctuations are thought to have greatly influenced settlement patterns in Palestine before 3000 B.C. (Blake, 1969), caused the abandonment of peripheral settlements by puebloan peoples of the southwestern United States (Haury, 1958; Kelley, 1952; Woodbury, 1963), and along with destructive cultural practices been instrumental in the expansion of the Rajasthan Desert in India (Bryson and Baerreis, 1967; Joshi, 1969).

3. Geomorphology. An understanding of past climates can be gleaned from the geomorphological evidence in the form of ancient lakes, sand dunes, alluvial plains, dissected plateaus, and accelerated erosion and arroyo cutting (Hastings and Turner, 1965; Norin, 1932; Peel, 1966; Sandford, 1933; Semmel, 1971; Smith, 1963; Thornthwaite et al, 1942; Tricart, 1963; Verstappen, 1970). Grove (1968, 1970) has reconstructed an outline of climatic events of the Tertiary and Quaternary of the Sahara and Kalahari deserts based on geomorphological findings, as has Vita-Finzi (1967) for Algeria specifically. Mabbutt (1967, 1969) has recognized the importance of weathering agents in his discussions of climatic geomorphology, including Australia.

4. Plant Distribution. The distributional limitations imposed on plant species by their genetic environmental tolerances allow still another interpretation of present and past climatic events (Gupta, 1968; Jenik and Hall, 1966; Mulay, 1961; van Zinderen Bakker, 1967). Estimations of past plant distributions are based on several forms of data. Descriptions of vegetation from historical writings have been useful in the southwestern United States (Campbell, 1970; Christensen and Johnson, 1964; Cottam and Stewart, 1940; Dittmer, 1951; Hansen, 1947; Harris, 1966; Humphrey, 1958; Mehringer, 1967a; Murray, 1959). The re-photographing of vegetation at specific sites after periods of up to 80 years has provided direct comparative evidence of distributional changes (Hastings and Turner, 1965). Evaluation of these data in terms of climatic change is open to different interpretations as we attempt to distinguish man-caused vegetation change from

climatic-caused change. Nevertheless, even the differences have provided important insights.

5. Palynology. Palynologists have also employed phytogeographic information in studies of paleoclimatology. Vegetative changes of remote time periods are reconstructed from fossil pollen cores (Hansen, 1947), elevational changes of vegetation of 1,000 feet have been recorded for the period of the Wisconsin glaciation in the Mojave Desert (Mehringer, 1967b), and fossil pollen analysis for Recent periods indicates greater climatic stability in the Sonoran desert than has been interpreted from tree-ring and erosion studies (Martin, 1963).

6. Dendrochronology. Another key to past climates is found in the orderly yearly growth of many trees, particularly pines. In dendrochronological studies, the width of annual growth increments are used as measurements of effective precipitation during the years identified (Douglass, 1914; Schulman, 1938). Periods of widespread drought between the year 1500 and the present have been identified in the western United States (Fritts, 1965). Where precipitation patterns are complex, such as in areas characterized by both summer and winter rains, for instance, the validity of tree rings for estimating yearly patterns has been questioned (Martin, 1963).

From these diverse forms of evidence, the outlines of past climatic events begin to emerge sufficiently to allow reconstruction, at least in some arid regions of the world. With this understanding should come a better knowledge of the present and the role of climatic change in the phenomenon of desertification.

MAN'S ACTIVITIES

In addition to climatic changes, man's activities in deserts and their marginal belts are usually implicated in assessments of the causes of desert encroachment (Cloudsley-Thompson, 1970; Dregne, 1969; Stebbing, 1935). Major land abuses result from agronomic and pastoral practices principally centered in semiarid zones. Events of 1973 in the Sahel underline the view that regions most severely threatened by desertification are not the interior extremely arid zones, the true deserts themselves, but the less arid marginal areas around them. Here where precipitation is higher, ecosystems have developed in which plant communities include many perennial as well as annual species. In these semiarid areas, where productivity is much greater than in the extremely arid zone, where rainfall is frequent enough to cause rapid erosion of unprotected soil surfaces, and where man is prone to mistake short-term economic gains under temporary favorable conditions for long-term stability, is to be found the combination of circumstances that is so conducive to desertification.

1. Agricultural and Irrigation Practices. The cumulative effect of man's activities on the creation of desert conditions must be viewed as severe. We are not the first generation to recognize this, however, for Lowdermilk (1935), among others, interpreted the fall of ancient civilizations in arid and semiarid regions to such land abuses and the resulting erosion and soil deterioration, citing examples from northwest China [see also Academia Sinica, 1958, 1962], the Sahara, the Peruvian coastal desert, and Mayan Mexico. Man, functioning under conditions of climatic fluctuation rather than long-term (in the geologic sense) climatic changes, is thought to be responsible for the formation of the Rajasthan desert in northwest India (Joshi, 1969; Misra, Prasad, and Bhan, 1968; Mulay, 1961). Bryson and Baerreis (1967) believe that precipitation has been measurably reduced in the Rajasthan by atmospheric dust constantly eroding from the now unstabilized surface, a consequence of agricultural failures.

Soviet climatologists, on the other hand, have pointed out that human activities themselves may have climatic consequences in terms of their effects on local energy balances. Budyko, Drozodov, and Yudin (1971) maintain that most incoming radiation in the desert heats the atmosphere through sensible heat flux, causing the temperature of the air masses to rise and the relative humidity to drop. As a result of irrigation, however, evaporation increases and the temperature of the ground surface decreases. The economic impact implicit in this concept might be

interpreted either affirmatively or negatively, though the effects in arid and semiarid regions would appear to be positive.

Nevertheless, when crops are to be planted in arid and semiarid regions, native vegetation invariably has been stripped from the land, and the soil surface thus altered by exposure to sun, wind, and rain (Amiran, 1966; Bennett and Chapline, 1928; Charley and Cowling, 1968; Ganssen, 1960; Jordan and Maynard, 1970; Kellogg, 1953; Stebbing, 1954). If poorly managed or abandoned because of unfavorable economic or climatic fluctuations, such regions, especially in semiarid areas, can be eroded rapidly by wind and water, with little or no vegetative productivity, becoming far less useful to man's needs as they take on the characteristics of the true desert environment of which they are now an extension (Ayres, 1971; Dortignac, 1963; Kassas, 1970; Konobeeva, 1968; Riney, 1971; Sauer, 1955). It is precisely these marginal border areas of the world's deserts, where crops may grow well and grazing is good in a good year or series of years, that are most frequently the victim of fluctuating annual rainfall and periodic droughts (Peel, 1966; Phillips, 1954).

When drought years occur, fields are left fallow, abandoned to the forces of erosion. Carrying capacity of rangelands is drastically reduced, even below the requirements of existing livestock (Bentley, 1898; Newman and Condon, 1969). Resulting overgrazing destroys what sparse vegetative cover remains (Morris, 1948; Pearse, 1970; Phillips, 1954). The effects of these climatic fluctuations in marginally desertic areas are thus made more severe by man's interventions that may cause extensive, even irreversible soil erosion (Thornthwaite et al, 1942). The dust bowl of the 1930's in the American west and midwest is a prime example of this form of destructive practice (Christensen and Hutchinson, 1965; Sears, 1959), where forests and prairie grasses were removed, soil plowed, livestock populations built up, all during periods of unusually high rainfall. When drought finally came, as a fuller understanding of the climate would have predicted, it had a disastrous effect. Over extensive areas winds blew the topsoil from formerly productive fields. Clouds of dust filled the sky. People were forced to abandon the land and migrate to other regions. Perhaps only in affluent America, with its vast resources of manpower, machine power, financing, and research capabilities would the regeneration of this wasted land have been attempted in the succeeding generation.

In truly arid zones, crop cultivation is dependent on irrigation, where field practices as well as water quality are of prime importance in the

maintenance of irrigated agriculture. Problems of salinity, waterlogging, and soil compaction (Aart, 1972; Casey, 1972; Kruseman, 1968; Lowdermilk, 1935; Michel, 1972) can be ruinous to irrigation-dependent societies. Abandonment by pre-Columbian Hohokam Indians of settlements on major drainages in central Arizona has been attributed to their failure to employ necessary safeguards (Ayres, 1971). After soil fertility and structure have been destroyed, the land is abandoned to the erosional forces of wind and water (Stebbing, 1954).

2. Grazing. Open grazing of domesticated animals on rangelands, which may vary from ephemeral wadis to well-established perennial grasslands, is one of man's oldest patterns of land utilization in arid and semiarid regions (Brown, 1971; Peterson, 1970). "Management" — and the term must be applied advisedly — practices are historically as well as presently extremely diverse, differing for sheep, cattle, goats, or camels. Also, pastoral methods are closely tied to sociological phenomena of the practitioners' culture, wherein livestock may be raised and maintained as a means of amassing wealth or prestige, rather than for the more immediate and practical production of meat, milk, and hides (Abou Zeid, 1967).

Most of these grazing practices tend to alter natural plant associations in species composition, as several studies on the nature and extent of these vegetational changes show (Adam, 1967; Costello and Turner, 1941; Cottam and Evans, 1945; French, 1968; Gardner, 1950; Halwagy, 1962). Using grazed and ungrazed areas, the aim of these investigations has been to arrive at a better understanding of their nature, to the end that range managers can avoid practices that have led in the past to detrimental shifts of vegetation.

The extent of damage resulting from overgrazing is directly related to the carrying capacity of the vegetation and the alimentary habits of livestock. Carrying capacity changes from season to season (Mueggler, 1950) and from year to year (Martin, 1964). When droughts occur and stock numbers are not reduced, as frequently occurs in the outback of Australia (Newman and Condon, 1969), resulting overgrazing causes loss of vegetative cover, followed in turn by soil erosion. Severe overgrazing of sheep by the Navajo Indians in Arizona has resulted in extensive soil erosion and loss of vegetative productivity (Sauer, 1955). Arroyo cutting in the American southwest has been attributed to the introduction and overgrazing of cattle in the area during the late 1800's (Bentley, 1898; Hastings and Turner, 1965). To deal with these continuing practices,

known to be damaging, Peterson (1969) tries to strike a more hopeful note by appealing for international training in effective range management.

Since cattle are largely grazers of grass, the widespread use of rangeland for this purpose may be responsible for the invasion of woody plants into formerly semiarid grasslands in such remote areas as the southwestern United States (Humphrey, 1958) and the Karroo portion of South Africa (van der Schuff, 1957). The understanding of brush encroachment in grassland is complicated by burning practices, the spread of seeds such as mesquite after ingestion by cattle (Humphrey, 1958), and climatic changes (Martin, 1963). Invasion of grassland by mesquite (Prosopis juliflora), burroweed (Haplopappus tenuisectus), and juniper (Juniperus monosperma) has seriously reduced the carrying capacity of rangelands (Brown, 1950; Harris, 1966). In response, mechanical, chemical, and controlled burning practices have been employed to eliminate the invasion of woody plants and restore the grasses (Aro, 1971; Love, 1970).

Authorities around the world agree that of all domesticated livestock, goats are the most destructive of native vegetation (Amiran, 1966; Atkinson and Beaumont, 1971; Cloudsley-Thompson, 1970; Stebbing, 1937). The ability of goats to feed on browse, even climbing trees for small branches, allows them to be pastured in areas already stripped of herbaceous vegetation by sheep or cattle. Also, reduced dependence on access to water allows goats to graze areas not utilized by sheep and cattle. Thus, they carry the land still another step nearer desertification.

Numerous countries have initiated well-drilling programs to spread livestock out over wider areas, but problems have resulted from poor placement of wells and overgrazing in the environs of the newly-established sites, where concentration of stock around water holes and settlements has resulted in severe stripping of vegetative cover (Grove, 1971). Settlement of nomads, many of whom continue to maintain livestock outside the settlements, has aggravated this problem in portions of the Sahara.

3. Fire. Man's employment of fire to alter deliberately the vegetative balance in arid and semiarid areas has been closely associated with the grazing of animals (Boughey, 1963). Pastoral peoples have burned dried grass ranges to stimulate new growth of grasses. Phillips (1963, 1965a) has reviewed the uses and misuses of fire in trans-Sahara Africa. Its use has been widespread, and may be responsible for the establishment and

maintenance of many grasslands in areas where the climatic climax vegetation would have included more woody species (Sauer, 1955).

In extensive portions of the southwestern United States, where fire has been routinely suppressed until recent years, brush encroachment is a major problem (Leopold, 1924; Humphrey, 1958). It is argued that in the past, frequent hot grassland fires destroyed the young mesquite and unpalatable woody shrubs before they were able to become a nuisance.

Rather than looking upon such woody browse invaders as nuisances, Martin (1970) has proposed the ranching of exotic browse-feeding herbivores, the African eland for example, in arid North America. Since these animals could utilize the same areas as cattle (Russell and Martin, 1972), much interest has developed in this idea, the advantage being that competition would be slight as cattle are predominantly grazers. Ecologically sound innovations such as this, if sound it prove to be, will be important to consider in developing less destructive grazing practices while at the same time responding to the world's growing food needs.

4. Nomadism. Nomadic pastoralism and transhumance are historic cultural forms in the interior Asian steppes, southwest Asia, and the Arab Near East. In some regions of these arid and semiarid zones, range conditions are highly dependent on infrequent and undependable local rainfall. In response, nomadic herders have evolved social systems that center around the needs of their stock (Brown, 1971; Heady, 1972; Mitchell, 1971).

In recent years, many governments in these areas have carried out programs of settling nomads on agricultural lands (Abou Zeid, 1967; Darling and Farvar, 1972; Filali, 1967; Schamp, 1967; Tredyte, 1969). In Sudan, the United Nations has aided (Mahgoub, 1967), in Jordan, the World Food Program (Qalyoubi, 1967). The rationale behind these settlement programs is complex and differs from one situation to another.

Filali (1967) finds nomadism to be an anachronism, the remnant of a marginal social system that only aggravates the economic backwardness of emerging countries. Sometimes settlement has been imposed forcefully, for political reasons of control, taxation, and "progress" (Darling and Farvar, 1972). LeHouerou (1970) notes the historic antagonism between

sedentary and nomadic populations in North Africa. In certain areas, grazing lands have been lost to cultivation (Mansour, 1967), or flooded for projects such as the Aswan High dam (Awad, 1964). In parts of the Sahara, nomadism is considered a sociological problem that widens the economic gap between the modern and traditional segments of the population (Abou Zeid, 1967; Filali, 1967; Mahgoub, 1967). Contradicting this view, Darling and Farvar (1972) indicate that living standards of nomads in some parts of the Sahara are higher than those of sedentary populations. In Somalia, where the majority of the population is nomadic, efforts are being made to improve the nomads' way of life (Box, 1971).

It is becoming increasingly apparent that the conversion of proud and independent nomadic peoples into settled agriculturalists is not simply a problem of available technology. It involves drastic sociological changes on the part of the people involved, many of which are resisted (About Zeid, 1967; Pevetz, 1968; Qalyoubi, 1967). Unless the proponents of such projects can realistically guarantee a decidedly better existence, which, given the political, economic, and climatic instability of many of these areas, is difficult, nomads can be expected to defend stubbornly the security, however misplaced, of their present livelihoods.

Recently in a shift of opinion based on an increasing number of studies, some scientists have defended the nomads' way of life as the most ecologically sound system of land utilization in these areas (Asad, 1964; Cloudsley-Thompson, 1970; Darling and Farvar, 1972; Gautier-Pilters, 1965; Heady, 1972). They point out possibilities of modernizing nomadism as an alternative to eliminating it (Chabert, 1966). Cloudsley-Thompson (1970) emphasizes that it would be impossible to recreate this way of life if it were to be phased out. Utilization of mobile schools, air-lift medical assistance, radioed notification of range conditions, and the drilling of wells, all could improve the lives of nomads while maintaining a sociologically acceptable and ecologically sound grazing industry (Cloudsley-Thompson and Chadwick, 1964). The employment of natural tribal groupings with established alliances (Parsons, 1965) and the development of new patterns of land tenure could contribute to the success of modernizing nomadism (Christodolou, 1970; Dufour, 1971; Riney, 1971; Zghal, 1967), and insofar as nomadism contributes to the degeneration of semiarid grazing land, to the amelioration of that as well.

If this type of nomadism could be determined to be ecologically sound in the context of range management and land use in arid regions, programs designed to eliminate it should be scrutinized carefully. Would replacement of nomads by less flexible grazing practices and by irrigated or dryland agriculture result in further deterioration of vegetation and soil, with a resultant, even accelerated, spread of desert conditions?

5. Sand Stabilization and Reforestation. Alteration or loss of the natural vegetative cover in the semiarid marginal desert areas is, as we have seen, one of the first changes leading to desertification. Whether accomplished by climatic change or by human intervention, the resulting exposed soils are unstable and subject to accelerated wind and water erosion (Dortignac, 1963). After destruction of the soil cover, reversal of the process becomes difficult. Two closely-related strategies have been utilized to combat these symptoms of spreading desertification. One is sand stabilization, the other reforestation.

Stabilization of blowing moving sand dunes is possible (Dougrameji and Kaul, 1971; Ibrahim, 1969). In semiarid areas, the establishment of tree-shrubs and perennials achieve the best results; in arid areas, low shrubs and perennial and annual grasses may be useful if they are protected by windbreak; in extremely arid areas, physiochemical reclamation is more successful using clay, bitumen, rubber, or petroleum products. Programs in the Thal of West Pakistan and in Argentina have shown that soil stabilization can be accomplished by the introduction of forage grasses (French, 1968; Prego et al, 1971). Mechanically, a number of products have been developed to stabilize sand surfaces (Alvarez de Benito, 1972; Petrov, 1971; U.S. AID, 1972), used to stop sand movement where vegetation cannot be established because of low precipitation or surface instability. After stabilization, vegetation establishment is sometimes possible.

The aims of afforestation give high priority to stabilization of surface materials and the prevention of erosion in semiarid watersheds (Leibundgut, 1955). Windbreaks, shelterbelts, and tree plantations are utilized (Liao, 1964). Practices of afforestation in arid and semiarid areas of Mexico, Brazil, South Africa, Tunisia, Algeria, Morocco, Indo-Pakistan, USSR, Central Asia, and Australia have recently been reviewed (Kaul, 1970). The choice of species is largely dependent on local conditions and needs. Exotics are generally more widely used than native species, including Eucalyptus, as well as Acacia, Prosopis, and Tamarix.

The cutting of wood for fuel to cook and to heat dwellings has resulted in the destruction of many forested areas on the margins of deserts. In heavily populated sections of such areas, the demand can be enormous, resulting in the deforestation of all surrounding areas (Cloudsley-Thompson, 1971), followed by soil erosion as the wind takes over and desertic conditions spread into once forested areas. Reversal of this very destructive practice in poor countries would invoke hardships as long as other sources of fuel remain prohibitively expensive, even if available.

Although sand stabilization and reforestation have proved experimentally successful in certain areas, applicability on a wide scale to the problems of desertification, particularly in underdeveloped countries, remains questionable (Grove, 1971). Costs involved are high, possibilities of realizing substantial returns on the investment usually small, and capital, therefore, usually unavailable.

DOWN THE ROAD: A LOOK AHEAD

There can be little doubt that man's economic activities in fragile arid ecosystems, frequently compounded by climatic fluctuations, have contributed to the accelerated desertification of the arid and semiarid zones of the world. These areas are suffering their greatest deterioration as natural resources just as man's need of their productive capacity is rising with world population (Peterson, 1970; White, 1966, 1970; Whyte, 1966).

White presents an excellent summary of the future of arid lands (1960) that even now after the passage of more than a decade exposes the social causes of increasing desertification:

> "...Much of the resource deterioration in the arid zone is in the face of sound scientific knowledge of possible ways of preventing much of it: from a technical standpoint many irrigated lands need not be salted, and the pasture lands need not be eroded. Yet the destruction continues. Part of this desperate gap between knowledge and application can be explained in terms of mass education, teacher training efforts, and the state of mind of high officials, but part of it remains in the realm of speculation. For the understanding is lacking on which to base solid programmes of corrective action."

A number of regional or international programs nevertheless have been proposed or initiated to deal with the problems of desertification (Cloudsley-Thompson, 1970; Ibrahim, 1967; Kassas, 1971; St. Barbe Baker, 1966). The U. S. Agency for International Development is devising proposals for the development and managment of the sub-Saharan semiarid region(*). The United Nations Development Programme (1966) has addressed itself and its funds to several problems and areas where the most acute are those related to desertification in economically underdeveloped arid and semiarid countries. All too often these areas appear to be entangled in sociological, economic, and political complexities that work to erase all efforts aimed at reversing land resource deterioration. While increasing human populations and rising economic expectations foster a continuation of land management practices known to be destructive, the necessary local technology and investment capital

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(*) In-House Report, October 1972

are not being made available to offset these trends. Perhaps the United National Secretariat on the Environment, to be established in Kenya, will, in this appropriate setting, become the focus for the needed recognition of the problems involved by the countries most directly affected.

1. Land Use: Planning and Development. As pressures mount for increased production of food to meet the increases in population levels, the utilization particularly of semiarid regions can be expected also to increase (Peterson, 1970). This could have disastrous consequences because, as we have noted above, it is these very semiarid marginal regions on the borders of the true deserts that are most susceptible to desertification (Winterbottom, 1971). Here precipitation fluctuations from year to year and from decade to decade can be expected. When rainfall is abundant, it will be difficult to resist build-ups of livestock numbers and the plowing of virgin fields. Then, when drought years return, as they inevitably will, the land will be subjected to pressures from which it cannot recover, ripe for the degeneration concomitant with this short-sighted practice.

Careful management of these areas, based on long-term considerations rather than the sometimes more urgent immediate requirements of present needs, is necessary if their natural resource base is not to be squandered (Kruseman, 1968). Of prime importance is the recognition of climatic realities, the acceptance of droughts as part of any land utilization plan. If man expects to make use of these areas on a permanent basis, he must adopt a strategy of land management that reflects both the long- and short-term climatic patterns of the region (Lowdermilk, 1960).

2. Weather Modification. Unless, of course, he succeeds in accumulating sufficient data on his weather modification investigations to master the climate of these areas with insufficient natural rainfall or surface/underground water to sustain a viable irrigation agriculture (Cooper and Jolly, 1969; National Academy of Sciences, Committee on Atmospheric Sciences, 1973; Simons, 1967). In the USSR Soviet scientists have undertaken projects in their own desert lands to achieve artificial increases of precipitation, water flow reversal, and desalination (Dunin-Barkovskiy, 1968), while in Israel experiments in several similar technologies have been assumed (Gabriel, 1967; Israel National Council for Research and Development, 1971). The Israelis also are compiling through their Center of Scientific and Technological Information, Tel-Aviv, a quarterly newsletter [not in this bibliography] called "Artificial Rainfall" (No. 1, April 1970- to date), that contains not only abstracts of worldwide information but also reports on work in progress.

American meteorologists and others have conducted certain investigations in the Indian deserts (Bryson and Baerreis, 1967; Peterson and Bryson, 1968). In the United States, cloud seeding experiments in southern Arizona (Neyman and Osborn, 1971) have begun to acquire valuable data. Project Skywater, a program sponsored by the U. S. Bureau of Reclamation, has been experimenting with drought alleviation (Todd and James, 1972) by the development of the technology required for the management of atmospheric water in other parts of the western United States, but present operations have not yet yielded enough scientific data upon which to base a sound evaluation (Henderson and Carley, 1971). The technology itself, however, even if proved successful, will not answer the legal, economic, ecological, and social problems its success will raise (Fleagle, 1969). A recent WRSIC bibliography on weather modification (U.S. Office of Water Resources Research, Water Resources Scientific Information Center, 1973) also reflects the anxiety about these aspects that parallel the technical uncertainties expressed twenty years ago by the World Meteorological Organization (1954).

We can only say, then, that these implications of weather modification for the phenomenon we call desertification are as yet somewhat tangled and obscure. We can attempt to extrapolate from the evidence of the references cited immediately above what effect such technology might or may have on areas like the Sahel, whether such technology might or may reverse the process of desertification, or set in motion a new train of adverse environmental effects we cannot anticipate (Flohn, 1971). Perhaps the only immediate certainty is that at least the right questions are being asked on all levels, formally and informally.

While weather modification projects that will benefit the arid zone are intended to induce rainfall by artificial means, or to increase watershed runoff from snowpack to desert floor, this technological experimentation has not yet provided us with the data that will predict the consequences. Meantime, the nagging problem of insufficient water remains as one basic root of all the problems involved in the phenomenon under discussion here. Yet such a simplistic view of the matter will hardly suffice in these last remaining years of the twentieth century, for mismanagement of existing water resources has contributed its share of the blame for widespread desertification (Achi, 1971; Amiran, 1970; Gardner and Myers, 1967; Michel, 1972; United Nations Development Programme, 1966). Add to this, sociological problems of over-population (LeHouerou, 1968, 1970), lack of education and training (Peterson, 1970), cultural obstacles to new ways of achieving old goals (Mitchell, 1971), and, superimposed on these to exacerbate the situation, political and economic factors (Phillips, 1965b; Qalyoubi, 1967; St. Barbe Baker, 1966; White, 1966),

and we come up with fairly well-established reasons for the worldwide climate of cynicism and despair that characterizes much thinking on the subject.

Perhaps an analogy to the survival strategies of desert plants may be useful.

Nomads of true deserts generally depend heavily on ephemeral vegetation. This is reflected in the ephemeral nature of their grazing practices (Asad, 1964; Mitchell, 1971). As ephemeral plants spring from the desert after sporadic rainfall, nomads' flocks are moved from spot to spot following the scattered forage left by the rains. In regions of greater precipitation, such as the semiarid zones, perennial vegetation is more likely to dominate the landscape. Here, the survival of vegetation on a permanent basis is not a result of the years of highest rainfall or the mean rainfall, but rather the ability of these plants to live through the worst years of lowest rainfall. For if they are not able to survive conditions during years of minimal precipitation, they will not be found in the region, at least not for very long. Also, their productivity is not constant and stable from year to year, but fluctuates, depending on climatic conditions.

Any human efforts aimed at sustained utilization of these semi-desert regions for grazing or crop production, utilizing local sources of water, must integrate factors that reflect the stresses of these years of minimal precipitation and the fluctuating nature of plant productivity if they are to be successful.

Useful strategies of resource development in semiarid lands must remain cognizant of the droughts that will occur. Establishment of constant levels of agricultural productivity in these regions simply cannot be expected, except perhaps at minimal levels. Rainfall is the limiting factor to productivity, and rainfall in these regions is highly erratic in nature.

Mounting pressures for optimal utilization and productivity of desert regions are likely to initiate practices that under the climatic patterns discussed will result in the destruction of the natural resource base: vegetation and soils. It can only be hoped that some balance can be achieved between the needs and desires of man and the ecological realities of the arid and semiarid regions of the world.

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ASPECTS OF DRAINAGE AND LAND RECLAMATION IN THE LOWER MESOPOTAMIAN PLAIN: A PROBLEM ANALYSIS.

INSTITUTE FOR APPLIED RESEARCH ON NATURAL RESOURCES, BAGHDAD (IRAQ), TECHNICAL BULLETIN 34. 23 P. SWRA W73-07135.

THE OLDEST FORM OF ANY PRIMITIVE RECLAMATION PRACTICE IN THE WORLD IS ASCRIBED TO THE SUMERIANS WHO RECLAIMED LAND AS EARLY AS 3000 B.C. BY BORDERING TRACTS IN THE MARSHES OF THE DELTA PLAIN WITH LOW EARTHEN DAMS AND DRAINING THEM. THE FIRST APPEARANCE OF SALINITY WAS ATTRIBUTED TO THE SAME ERA. A DECLINE IN THE AGRICULTURAL PROSPERITY WAS NOTED AND AN OVERALL SHIFT IN LAND USE TOOK PLACE CHANGING FROM ANNUAL WINTER CULTIVATION (MAINLY) TO A SYSTEM OF FALLOW LAND ROTATION. THE OBJECTIVE OF THIS STUDY IS TO CONTRIBUTE TO A BETTER UNDERSTANDING OF THE PROBLEMS OF WATERLOGGING AND SALINIZATION, TO DELINEATE WHY SO MANY FAILURES TOOK PLACE IN THE IMPLEMENTATION OF EARLIER LAND RECLAMATION SCHEMES, AND TO GIVE SOME BROAD LINES ALONG WHICH ANY FUTURE RECLAMATION ACTIVITY SHOULD PROCEED. A SUMMARY IS INCLUDED OF THE PHYSIOGRAPHY, SOIL, CLIMATE, VEGETATION, HYDROLOGY, AND SALINITY OF THE PLAINS. PROBLEMS OF WATERLOGGING AND SALINIZATION CAN BE SOLVED BEST BY CONTROL OF THE WATER TABLE (DRAINAGE), AND SUBSEQUENT DESALINIZATION, DEALKALINIZATION AND CROPPING (RECLAMATION). DRAINAGE CRITERIA ARE OUTLINED AND PERMEABILITY OF THE SOIL IS ANALYZED IN DETAIL. (OALS)

OALS/DRAINAGE/LAND RECLAMATION/LAND USE/REGIONAL ANALYSIS/SATURATED SOILS/DAMS/SALINE SOILS/SALINITY/AGRICULTURE/CULTIVATION/EVALUATION/ WATER RESOURCES DEVELOPMENT/GROUNDWATER/PERMEABILITY/SODIUM-AFFECTED SOILS/SOIL ANALYSIS/IRAQ/MESOPOTAMIAN PLAIN

2

ABOU ZEID, A.M.

1967

SEDENTARIZATION AND LAND PROBLEMS. IN M.R. EL GHONEMY, ED., LAND POLICY IN THE NEAR EAST, P. 53-65.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME. WAERSA (10)810.

SEDENTARIZATION IS SOMETIMES REGARDED AS A PURELY TECHNICAL OPERATION WHICH ENVISAGES SETTLING CERTAIN GROUPS OF PEOPLE IN CERTAIN AREAS OF LAND WHERE THEY CAN TAKE TO AGRICULTURAL AND OTHER RURAL ACTIVITIES. BUT HOWEVER IMPORTANT THIS SIDE OF THE PROBLEM MAY BE, SEDENTARIZATION IS ESSENTIALLY A COMPLICATED SOCIAL PROCESS WHICH LEADS IN THE END TO THE EMERGENCE OF A NEW SOCIETY WITH NEW INSTITUTIONS, NEW VALUES AND NEW PATTERNS OF BEHAVIOR. MAJOR SOCIAL DIFFICULTIES ARISE BECAUSE MOST DESERT INHABITANTS REGARD NOMADIC LIVESTOCK REARING AS THE MOST HONOURABLE JOB A MAN CAN PRACTICE, AND LIVESTOCK AS THE MAJOR ITEM OF WEALTH. NOMADS ARE NOT READY TO SACRIFICE THIS FOR AGRICULTURE, AND FOR MANY NOMADIC GROUPS AGRICULTURE IS A NEW ACTIVITY OF WHICH THEY HAVE LITTLE EXPERIENCE. IF THE NOMADS SHOW MUCH RESISTANCE TO SEDENTARIZATION, IT IS NOT MERELY BECAUSE THEY ARE CONSERVATIVE AND UNWILLING TO ACCEPT CHANGES, BUT ALSO BECAUSE OF THE LOSSES WHICH THEY

THINK, RIGHTLY OR WRONGLY, THAT THEY WILL SUFFER, ESPECIALLY WITH REGARD TO LAND. BUT WHATEVER THE POLICY ADOPTED BY THE DIFFERENT GOVERNMENTS, THE PRIMARY OBJECTIVE AGAINST WHICH SUCCESS SHOULD BE MEASURED MUST SURELY BE THE NARROWING OF THE ECONOMIC, SOCIAL AND CULTURAL GAP BETWEEN THE NOMADIC AND THE SEMINOMADIC INHABITANTS OF THE DESERT AND THE REST OF THE POPULATION IN EACH COUNTRY.

OALS/SETTLEMENTS/NOMADS/SOCIAL ASPECTS/HUMAN BEHAVIOR/LAND RESOURCES/ POLITICAL ASPECTS/LIVESTOCK/MIDDLE EAST/ECONOMIC DEVELOPMENT

3

ACADEMIA SINICA, SAND CONTROL TEAM

1958

SHA-MO TI-CHU TI TSUNG-HO TIAO-CHA YEN-CHIU PAO-KAO (A REPORT ON THE COORDINATED RESEARCH ON THE DESERT REGIONS), 1-2. SCIENTIFIC PUBLICATIONS SOCIETY, PEIPING, 108 P. TRANSLATION ISSUED 1963 BY

U.S. JOINT PUBLICATIONS RESEARCH SERVICE, WASHINGTON, D.C., AS JPRS DOCUMENTS 18,658 AND 18,178.

A COMPREHENSIVE DESERT SURVEY, ORGANIZED IN 1957, TO FIND METHODS OF SAND CONTROL AND UTILIZATION FOR THE AMELIORATION OF THE EXTENSIVE AREAS IN CHINA S NORTHWEST REGION THAT ARE DESERTIC. SOILS, GEOMORPHOLOGY, CLIMATOLOGY, AND VEGETATION ARE SURVEYED IN GREAT DETAIL AS A PRELIMINARY TO UNDERTAKING RECLAMATION MEASURES. ALTHOUGH THE EMPHASIS APPEARS TO BE ON REVEGETATION PRACTICES, ATTENTION IS GIVEN TO SOIL CONDITIONING, LIVESTOCK CARE, WATER SALVAGE, AND LAND USE CLASSIFICATION. THE FAIRLY SIMPLE AND PRACTICAL METHODS SUGGESTED ON THE BASIS OF TRIAL SAMPLING SHOULD BE USEFUL IN A WORLDWIDE CONTEXT WHERE SOPHISTICATED TECHNOLOGICAL METHODS ARE UNAVAILABLE. THE MAJOR PORTION OF THE TEXT OF THE SECOND OF THESE TWO REPORTS IS BY SOVIET ACADEMICIAN M.P. PETROV. (OALS)

OALS/SAND CONTROL/SAND DUNES/DUNES/WIND ACTION/WIND EROSION/DESERTS/ REVEGETATION/CHINA/SINKIANG/TARIM BASIN/CENTRAL ASIA/LAKE BASINS/ SURVEYS/LAND RECLAMATION/ORDOS/SALINE SOILS/AFFORESTATION/SHELTERBELTS /VEGETATION ESTABLISHMENT/DESERTIFICATION

4

ACADEMIA SINICA, SAND CONTROL GROUP

1962

CHI-SHA YEN-CHIU (SAND CONTROL RESEARCH), 3. PEIPING, 203 P. TRANSLATION ISSUED 1963 BY

U.S. JOINT PUBLICATIONS RESEARCH SERVICE, WASHINGTON, D.C., AS JPRS DOCUMENT 19,993. 508 P.

RECLAMATION OF CHINA S NORTHWEST DESERT REGIONS THROUGH SAND CONTROL WAS THE FOCUS OF THE INVESTIGATIONS REPORTED HERE. IT INCLUDES CONSIDERABLE DETAIL ON THE HYDROLOGY, GEOGRAPHY, SURFACE MATERIALS, AND DYNAMICS OF THE AREAS COVERED, PARTICULARLY THE TAKLA MAKAN, TARIM BASIN, INNER MONGOLIA, AND SINKIANG IN GENERAL. ATTENTION IS GIVEN TO THE GEOLOGICAL HISTORY AS IT AFFECTS THE PRESENT GEOMORPHOLOGY OF THE

REGION. SPECIFIC RECOMMENDATIONS MADE FOR THE AMELIORATION OF CONDITIONS RESPONSIBLE FOR ITS DEGENERATION ARE BASED ON VEGETATION, TOPOGRAPHIC, AND HYDROLOGICAL SURVEYS. VEGETATION RE-ESTABLISHMENT SUCH AS WINDBREAKS AND REFORESTATION MEASURES SEEMS TO BE THE CHIEF PRESCRIPTION, ALTHOUGH THERE ARE SUGGESTIONS FOR THE USE OF SAND TO MIX WITH SALINE SOILS FOR CROPS. LEFT FOR FUTURE RESEARCH ARE WAYS OF INCREASING WATER SUPPLIES. (OALS)

OALS/SAND CONTROL/SAND DUNES/DUNES/WIND ACTION/WIND EROSION/DESERTS/ WINDBREAKS /EROSION CONTROL/TAKLA MAKAN DESERT/CHINA/SINKIANG/TARIM BASIN/ORDOS/MONGOLIA/CENTRAL ASIA/LAKE BASINS/SHELTERBELTS/BARRIERS/ DESERTIFICATION/REVEGETATION/VEGETATION ESTABLISHMENT/SURVEYS/SAND DESERTS/AFFORESTATION

5

ACADEMIA SINICA, SAND CONTROL GROUP

1962

CHI-SHA YEN-CHIU (SAND CONTROL RESEARCH), 4. PEIPING, 278 P. TRANSLATION ISSUED 1963 BY

U.S. JOINT PUBLICATIONS RESEARCH SERVICE, WASHINGTON, D.C., AS JPRS DOCUMENT 20,938. 751 P.

THE FOURTH (AND FINAL, QUESTION) OF THE COMPREHENSIVE REPORTS OF THIS INVESTIGATIVE TEAM THAT GAVE THE WORLD THE MOST DETAILED DESCRIPTION OF CHINA S NORTHWEST SAND DESERTS KNOWN. THIS LAST(AVAILABLE)STUDY IS ADDRESSED TO GEOMORPHOLOGICAL FEATURES OF THE ENTIRE AREA, ITS GROUNDWATER SUPPLY, DISTRIBUTION OF VEGETATION, SOIL TYPES, CLIMATOLOGY, AND WIND POWER. CLIMATIC FACTORS CONTRIBUTING TO THE 11 PERCENT OF CHINA S TOTAL LAND AREA THAT ARE CLASSIFIED AS DESERTIC ARE CONSIDERED, AS IS THE EFFECT OF PERTURBATION CAUSED BY MAN S ACTIVITIES. WHILE THE PREFATORY NOTE POINTS OUT THAT EVEN THIS REPORT IS TO BE CONSIDERED PRELIMINARY, NEVERTHELESS THE INFORMATION DISPLAYED IS DETAILED, RELATED, SCIENTIFIC, AND ORGANIZED. THE PHYSICAL CHARACTERISTICS OF THE REGION AND THEIR HISTORICAL DEVELOPMENT ARE NOW IN A FAIR WAY TO BEING BETTER KNOWN AND UNDERSTOOD. (OALS)

OALS/SAND CONTROL/DESERTS/CHINA/SINKIANG/TARIM BASIN/DZUNGARIA/ MONGOLIA/SAND DESERTS/GEOMORPHOLOGY/DESERTIFICATION/GROUNDWATER /WIND ACTION/ORDOS/CENTRAL ASIA/AFFORESTATION/VEGETATION ESTABLISHMENT/ REVEGETATION/BARRIERS

6

ACHI, K.

1972

SALINIZATION AND WATER PROBLEMS IN THE ALGERIAN NORTHEAST SAHARA. IN M.T. FARVAR AND J. P. MILTON, EDS., THE CARELESS TECHNOLOGY: ECOLOGY AND INTERNATIONAL DEVELOPMENT, P. 276-287.

NATURAL HISTORY PRESS, N.Y. 1030 P.

THE LOWER ALGERIAN SAHARA CONSTITUTES A ZONE WITH A RELATIVELY DENSE

POPULATION WHERE THE ONLY RESOURCES ARE PROVIDED BY AGRICULTURE: 11,000 HECTARES OF DATE PALMS. ABUSIVE EXPLOITATION OF THE SUBTERRANEAN ARTESIAN WATERS EVENTUALLY HAD A DISASTROUS EFFECT ON THE SUPERFICIAL WATER TABLE, PARTICULAPLY SO BECAUSE THE REGION LACKS GOOD SUBTERRANEAN OUT FLOW OF WATER. SALINITY HAS RESULTED IN THE DEATH OF MANY PALMS AND A REDUCTION IN YIELD OF SUBSISTENCE CROPS GROWN BETWEEN THE ROWS OF PALMS. SOCIOLOGICAL ASPECTS ARE TREATED AS ARE ECOLOGICAL CONSIDERATIONS IMPORTANT IN INDICATING UNFAVORABLE CONDITIONS OF ARID LANDS FOR IRRIGATION DEVELOPMENT.

OALS/ALGERIA/SAHARA/DATES/PALMS/GROUNDWATER/WATER RESOURCES DEVELOPMENT/WATER TABLE/SALINITY/IRRIGATION PRACTICES/SOCIAL ASPECTS/ECONOMIC DEVELOPMENT/ARTESIAN WELLS/DRAINAGE/IRRIGATION EFFECTS

7

ADAM, J.G.

1967

CHANGES IN THE VEGETATION IN THE PROTECTED SUBPLOTS OF UNESCO-IFAN AT ATAR, MAURITANIA (TRANSLATED TITLE).

INSTITUT FONDAMENTAL D AFRIQUE NOIRE, BULLETIN, SER. A, SCIENCES NATURELLES 29(1):92-106. HA(37)2005.

IN PLOTS PROTECTED FROM MAN AND LIVESTOCK IN A DESERT AREA OF THE SAHARA, AN INCREASE IN PLANT COVER WAS NOTED. HOWEVER, NO DEFINITE CONCLUSIONS COULD BE DRAWN BECAUSE THE OBSERVATIONS WERE MADE OVER A SHORT PERIOD ONLY AT IRREGULAR INTERVALS.

NORTH AFRICA/GRAZING/RANGE MANAGEMENT/VEGETATION/EXCLOSURES/VEGETATION CHANGE/SAHARA/UNGRAZED/MAURITANIA/OALS

8

ALVAREZ DE BENITO, G.

1972

SAND DUNE PROBLEMS AND HOW THEY WERE CONTROLLED AT EL AAIUN-WEST SAHARA.

ESSO STANDARD ESPANOLA, S.A., MADRID. 15 P.

THE INTRODUCTION OUTLINES DUST AND SAND PROBLEMS, THEIR CLASSIFICATION, DATA, EVALUATION AND RECOMMENDATIONS, FOLLOWED BY A BRIEF REPORT OF ESSO S EFFORTS TO PROTECT A MINING CONVEYOR BELT THAT CROSSES 9 KILOMETERS OF MOVING SAND. CONTROL HAS BEEN ACHIEVED BY SPRAYING A PETROLEUM OIL PRODUCT AND THE USE OF POROUS ARTIFICIAL FENCES. EXPERIMENTAL REVEGETATION IS ANTICIPATED.

AFRICA/SAND DUNES/ARID LANDS/EOLIAN SOILS /WIND EROSION/VEGETATION EFFECTS/WINDBREAKS/SHELTERBELTS/SOIL STABILIZATION/EROSION CONTROL/SEALANTS/SOIL TREATMENT/SOIL SEALANTS/SAHARA/OALS/SPANISH SAHARA

9

AMBE, Y.

1967

SECULAR VARIATION OF ARIDITY IN THE WORLD.

JAPANESE JOURNAL OF GEOLOGY AND GEOGRAPHY 38(1):43-61. MGA 19.2-319. GA 688-500. SWRA W71-04288.

AN ATTEMPT IS MADE TO UNDERSTAND RECENT CLIMATIC VARIATIONS FROM THE STANDPOINT OF SPATIAL VARIATION OF ARID CLIMATIC REGIONS. SINCE VARIATIONS IN ARID CLIMATES SEEM TO REFLECT SECULAR VARIATIONS OF GENERAL CIRCULATION, IT IS IMPORTANT TO DETERMINE WHETHER RECENT WORLD CLIMATIC VARIATIONS TAKE PLACE ON A GLOBAL SCALE, ON A HEMISPHERIC UNIT OR ON A CONTINENTAL SCALE. MONTHLY ARIDITY IS DEFINED ON THE BASIS OF THE PRECIPITATION (P)/EVAPORATION (E) RATIO, WHICH CORRESPONDS TO THORNTHWAITE S P-E RATIO. IF THE RATIO IS LESS THAN 1 FOR ANY MONTH, IT IS TERMED A DRY MONTH. AN ARID REGION IS DEFINED AS ANY REGION IN WHICH EVERY MONTH IS A DRY MONTH. USING PRECIPITATION AND TEMPERATURE DATA FROM A NUMBER OF YEARS OVER THE PAST HALF CENTURY, THE P-E RATIO WAS CALCULATED FOR EACH MONTH OF THE YEAR AND FOR ALL CONTINENTS EXCEPT THOSE LATITUDINAL REGIONS WHERE MEAN MONTHLY TEMPERATURES FELL BELOW -10 DEGREES CENTIGRADE. ALL ARID REGION BOUNDARIES WERE THEN DEFINED, AND THEIR VARIATION OVER TIME WAS DETERMINED. CLIMATIC CONDITIONS FORMING ARID REGIONS VARIED FROM YEAR TO YEAR, AND THE VARIATION WAS ALWAYS GREATER ON THE EAST SIDE THAN THE WEST. HOWEVER, IN THE PERIOD 1931-1960 NO REMARKABLE CHANGES WITH A DEFINITE TENDENCY WERE FOUND. FREQUENCY DISTRIBUTIONS HAD GENERALLY LARGE VARIANCES, INDICATING COMPLICATED ARID ZONE FORMATION FACTORS. IN YEARLY FLUCTUATIONS HEMISPHERIC SCALE VARIATIONS PREDOMINATED OVER THOSE ON A GLOBAL SCALE AND RELATIONSHIPS BETWEEN CLIMATIC VARIATIONS IN THE NORTHERN AND SOUTHERN HEMISPHERES WERE INSIGNIFICANT. THE LARGE VARIABILITY IN ARID REGION PATTERNS SHOWS THE CHARACTERISTICS OF CLIMATE ITSELF, REFLECTING CONDITIONS OF ATMOSPHERIC CIRCULATION.

OALS/ARIDITY/CLIMATIC CHANGE/ATMOSPHERIC CIRCULATION/POTENTIAL EVAPOTRANSPIRATION/ARID CLIMATE/TEMPERATURE RANGES/SYNOPTIC CLIMATOLOGY/VARIABILITY(ENVIRONMENTAL)

10

AMINULLAH

1970

BIBLIOGRAPHY OF C.A.Z.R.I. PUBLICATIONS, 1959-1969.

ARID ZONE RESEARCH ASSOCIATION OF INDIA, JODHPUR. 42 P.

INCLUDES 714 ENTRIES, CONTRIBUTED BY 128 AUTHORS, USING THE ANNUAL SCIENTIFIC REPORTS OF THE CENTRAL ARID ZONE RESEARCH INSTITUTE, ITS SYMPOSIA VOLUMES, AND LISTS OF PUBLICATIONS OF THE STAFF OF THE INSTITUTE AS SOURCES. SOME 50 CATEGORIES SERVE TO ARRANGE THE ENTRIES IN A KIND OF SUBJECT LIST. THERE IS AN AUTHOR INDEX.

OALS/BIBLIOGRAPHIES/DESERTIFICATION/INDIA/RAJASTHAN DESERT/DESERT PLANTS/GRASSLAND BIOME/PLANT ECOLOGY/LIVESTOCK/RANGE MANAGEMENT

11

AMIRAN, D.H.K.

1966

MAN IN ARID LANDS. II: PATTERNS OF OCCUPANCE. IN E.S. HILLS, EDS, ARID LANDS: A GEOGRAPHICAL APPRAISAL, P. 239-244.

METHUEN, LONDON; UNESCO, PARIS. 479 P.

THERE ARE THREE MAIN TYPES OF ARID ZONE OCCUPANCE OTHER THAN UNSTABLE MINERAL EXPLOITATION AND TRADE ROUTES. THESE ARE OASIS SETTLEMENT, SEDENTARY SETTLEMENT OF SEMI-ARID LANDS, AND NOMADIC OCCUPANCE OF SEMI-ARID OR ARID AREAS. THE OASES OF PICA AND TOCONAO IN THE ATACAMA DESERT ARE TYPICAL AND SIMILAR TO THE BREJOS OF NORTHEAST BRAZIL. VILLAGE LIFE IN SEMI-ARID AREAS IS DISCUSSED. AN EROSION CYCLE STARTED BY CUTTING OF FORESTS FOR MINE PROPS IN NORTE CHICO OF CHILE WAS AGGRAVATED BY GOAT GRAZING. THE SOIL SUFFERED CONSIDERABLE DETERIORATION OF TEXTURE, AND SEVERE GULLY EROSION DEVELOPED. EARLY NOMADIC POPULATIONS MAY HAVE EXTINGUISHED SOME VARIETIES OF FAUNA AND SEVERELY REDUCED OTHERS IN NUMBERS, BUT IT IS PROBABLE THEY ONLY ACCELERATED A NATURAL PROCESS OF ANIMAL DEPOPULATION BROUGHT ABOUT BY INCREASING ARIDITY.

ARID LANDS/SEMI-ARID CLIMATE/SOUTH AMERICA/SOCIAL ORGANIZATION/SOCIAL ASPECTS/WATER SOURCES/GOATS/ARID CLIMATE/SETTLEMENTS/OASES/ PERTURBATION/ENVIRONMENTAL EFFECTS/DESERTIFICATION/NOMADS/CHILE/ BRAZIL, NORTHEASTERN/ATACAMA/OALS

12

AMIRAN, D.H.K.

1970

EL DESIERTO DE SECHURA, PERU: PROBLEMS OF AGRICULTURAL USE OF DESERTS.

REVISTA GEOGRAFICA, 72:7-12. SWRA W71-10490

AGRICULTURAL DEVELOPMENT IN DESERT REGIONS IS SUBJECT TO MANY PROBLEMS, AND THIS IS WELL ILLUSTRATED IN THE AREA OF PIURA, LOCATED IN THE DESERT OF SECHURA, ONE OF THE WIDEST SECTIONS OF THE PERUVIAN COASTAL DESERT. ESTABLISHED ABOUT 40 YEARS AGO, THE AREA HAS 1300 FARMING UNITS OF 40 HECTARES EACH. COTTON IS THE MAIN CROP IRRIGATED BY BASIN FLOODING FROM THE PIURA RIVER. ADDITIONAL WATER SOURCES ARE WELLS SUFFERING FROM SEVERE OVERDRAFTS AND CONSEQUENT RISING SALINITY LEVELS, LEADING TO EXTENSIVE LAND DETERIORATION. THE RIVER ITSELF TURNS INTO AN ALKALINE DRAINAGE DITCH DURING LOW WATER SEASON DUE TO LACK OF A SEPARATE DRAINAGE SYSTEM FOR REMOVING USED IRRIGATION WATERS. A SIZABLE STORAGE RESERVOIR WITH A CAPACITY OF 258 MILLION CUBIC METERS HAS BEEN BUILT AT SAN LORENZO, BUT SUFFERS FROM ENORMOUS EVAPORATIVE LOSSES AND AN INSUFFICIENT REGIONAL HYDROLOGIC DATA BASE. AMAZINGLY, IN THIS REGION SUFFERING FROM A SPECTRUM OF RESOURCE PROBLEMS, THERE IS NO AGRICULTRUAL RESEARCH STATION. NOT FAR TO THE NORTH, THE LARGE EFFICIENT MALLARES FARM (6000 HECTARES) FURNISHES A STARTLING CONTRAST IN DESERT AGRICULTURE. INTELLIGENT LOCAL MANAGEMENT RESULTS IN A PROSPEROUS ENTERPRISE, INTEGRATING ADVANCED AGRICULTURE TECHNIQUES, BIOLOGICAL PEST CONTROL AND MINIMUM USE OF PESTICIDES AND ARTIFICIAL FERTILIZERS, AND FIRST AND FOREMOST, A STRICT IRRIGATION CUM DRAINAGE REGIME. (OALS)

OALS/ARID LANDS/IRRIGATION PRACTICES/SALINE WATER/LAND USE/LAND MANAGEMENT/WATER CONSERVATION/GROUNDWATER/RESERVOIRS/WATER RESOURCES DEVELOPMENT/WATER SOURCES/ENVIRONMENTAL EFFECTS/EVAPORATION/REGIONAL ANALYSIS/PERU/PERUVIAN DESERT/GOSSYPIUM/ORYZA/CROP PRODUCTION/ PESTS(INSECTS)/BIOLOGICAL CONTROLS/PESTICIDES/SECHURA DESERT/WATER MANAGEMENT/RESOURCES/SALINITY

13

ARO, R.S.

1971

EVALUATION OF PINYON-JUNIPER CONVERSION TO GRASSLAND.

JOURNAL OF RANGE MANAGEMENT 24(3):188-197.

CONVERSION TECHNIQUES APPLIED TO PUBLIC LANDS IN COLORADO, UTAH, ARIZONA, AND NEW MEXICO PROVIDED THE BASIS FOR AN EVALUATION OF SEVERAL METHODS. BURNING WAS THE MOST EFFECTIVE AND THE LEAST EXPENSIVE METHOD STUDIED, BUT REQUIRES DENSE VEGETATION TO CARRY THE FIRE. DOZING OF TREES INTO WINDROWS, FOLLOWED BY SEEDING OF GRASSES IN THE CLEARED AREAS, WAS THE BEST MECHANICAL APPROACH EXAMINED, BUT REQUIRES CAREFUL SITE SELECTION AND ECONOMIC EVALUATION. CHAINING WAS THE MOST WIDELY USED, BUT LEAST EFFECTIVE TECHNIQUE FOR CONVERTING PINYON-JUNIPER WOODLAND TO GRASSLAND.

OALS/WGM/WAT-C/COST-BENEFIT ANALYSIS/DIRECT COSTS/SOUTHWEST U.S./ CONTROLLED BURNING/CONVERSION(MANAGEMENT)/VEGETATION CHANGE/CLEAR-CUTTING/MECHANICAL CONTROLS/GRASSES/PINYON-JUNIPER/RANGE MANAGEMENT/ ARIZONA/COLORADO/UTAH/NEW MEXICO

14

ASAD, T.

1964

SEASONAL MOVEMENTS OF THE KABABISH ARABS OF NORTHERN KORDOFAN.

SUDAN NOTES AND RECORDS 45:48-58. GA 680-495.

THE IDEA THAT NOMADS AND NOMADISM ARE NECESSARILY ANACHRONISMS IS CONTESTED. THE SEASONAL MOVEMENTS OF THE HERDS AND HOUSEHOLDS IS EXPLAINED IN DETAIL TO ILLUSTRATE THE SKILLFUL WAY IN WHICH THE KABABISH UTILIZE THE POOR NATURAL RESOURCES OF SEMI-ARID NORTHERN KORDOFAN. IT IS EMPHASIZED THAT DAR KABABISH, THE AREA OCCUPIED BY THE KABABISH DURING THE HOT DRY SEASON, IS MUCH WIDER THAN THE KABABISH RURAL COUNCIL AREA CENTERED ON SODIRI AND INCLUDES NORTHEASTERN DARFUR AND THE SOUTH WESTERN NORTHERN PROVINCE AS WELL AS NORTHERN KORDOFAN.

OALS/WGM/NOMADS/TRANSHUMANCE/SEASONAL/LIVESTOCK/SEMIARID CLIMATE / KORDOFAN/DRY SEASONS

15

ATKINSON, K./BEAUMONT, P.

1971

THE FORESTS OF JORDAN.

ECONOMIC BOTANY 25(3):305-311. SWRA W72-06723.

THE CEDAR STANDS OF LEBANON ARE, HISTORICALLY, THE MOST FAMOUS OF THE FORESTED AREAS OF THE LEVANT, BUT OTHER FORESTED AREAS OF THE REGION, THOUGH LESS FAMOUS, STILL REMAIN OF VITAL IMPORTANCE. DISCONTINUOUS AREAS OF NATURAL FOREST ARE LOCATED IN THE CATCHMENTS OF THE WADIS FLOWING INTO THE MAIN RIFT VALLEY OF THE RIVER JORDAN. THE FORESTS OF THE NORTHERN HIGHLANDS ARE OF A GREATER EXTENT THAN THOSE OF THE SOUTHERN HIGHLANDS. IN THE NORTH THE CRITICAL LIMIT FOR TREE GROWTH APPROXIMATES THE 400 MILLIMETER MEAN ANNUAL ISOHYET. THE SOUTHERN FOREST OCCURS UNDER CONDITIONS OF CONSIDERABLY LOWER RAINFALL AND GREATER MARGINALITY. FIVE ASSOCIATIONS OF TREES MAY BE DISTINGUISHED IN THE NORTHERN FOREST AND 2 ASSOCIATIONS IN THE SOUTH. IN BOTH THE NORTH AND SOUTH THE FORESTS HAVE CONTRACTED GREATLY FROM WHAT WERE MUCH VASTER WOODED AREAS AND CONSIDERABLE AREAS OF THE PRESENT-DAY FORESTED REGIONS ARE TREELESS AND DEGRADED. GOAT OVERGRAZING HAS BEEN CUMULATIVE AND IS PROBABLY ONE OF THE MAJOR REASONS FOR THE DECLINE OF THE FORESTS. CULTIVATION OF VINES, WHEAT AND OLIVES HAS REMOVED THE CONTINUOUS CANOPY AND EXPOSED LARGE AREAS TO SOIL DEGRADATION TO THE POINT THAT THE FOREST CANNOT EVER BE REFURBISHED. FOREST ECOSYSTEMS IN SUCH ARID AREAS ARE BRITTLE AND EASILY DISRUPTED. OTHER REASONS FOR THEIR DECLINE INCLUDE INDISCRIMINATE LOGGING, THE BARKING OF OAK ROOTS FOR TANNIN, WOOD COLLECTION FOR FUEL AND POSSIBLE GREATER CLIMATIC ARIDITY. (OALS)

OALS/FORESTS/SEMIARID CLIMATE/BROWSE/SOIL EROSION/ PRECIPITATION(ATMOSPHERIC)/TREES/MOUNTAINS/NATURAL RESOURCES/LAND USE/ ECOSYSTEMS/MIDDLE EAST/JORDAN/GRAZING/PERTURBATION/LOGGING(TIMBER)

16

AUBREVILLE, A.

1949

CLIMATS, FORETS ET DESERTIFICATION DE L AFRIQUE TROPICALE (CLIMATES, FORESTS AND DESERTIFICATION OF TROPICAL AFRICA).

SOCIETE D EDITIONS GEOGRAPHIQUES, MARITIMES ET COLONIALES, PARIS. 351 P.

A SCIENTIFIC APPRAISAL OF THE PROBABLE EFFECTS OF THE DEGRADATION OF AFRICAN VEGETATION ON ITS TOTAL ENVIRONMENT. BY DETAILED ANALYSIS HE HAS ESTABLISHED THE FACT THAT THIS DEGRADATION IS HAVING A MARKED PERMANENT EFFECT ON SOILS AND CLIMATE.IN DEFORESTED AREAS THE CLIMATE IS INVARIABLY MORE ARID, THE DRY SEASON MORE ACCENTUATED, TEMPERATURES MORE EXTREME AND THERE IS A PROBABLE, BUT NOT AT PRESENT DEMONSTRABLE REDUCTION IN TOTAL RAINFALL. THE RUN-OFF OF SUMMER RAINFALL IS ACCENTUATED, EVEN TO THE POINT OF PRODUCING DEVASTATING SUMMER FLOODS, WHILE THIS SAME FLOW IN THE DRY SEASON IS DIMINISHED OR EVEN EXTINGUISHED. AREAS WHICH ARE AT PRESENT SUITABLE FOR THE PRODUCTION OF FOREST CROPS SUCH AS COCOA, COFFEE AND OIL PALM, BECOME OF USE FOR LITTLE BUT THE CULTIVATION OF CASSAVA. THE EFFECT OF MAN IS THE

GREATEST IN THOSE AREAS WHICH WERE ONCE THE MOST PRODUCTIVE. THE LOWER THE RAINFALL THE LESS MAN IS ABLE TO CHANGE THE AFRICAN ENVIRONMENT. IN THOSE AREAS OF SPARSE WOODY VEGETATION ON THE DESERT MARGINS THE EFFECT OF HUMAN OCCUPATION IS SCARCELY OBSERVABLE.

OALS/VEGETATION MAPS/PHYTOGEOGRAPHY/AFRICA/TROPICAL REGIONS/ DESERTIFICATION/CLIMATIC-VEGETAL RELATIONSHIPS/CLIMATIC CHANGE/ VEGETATION CHANGE/DEGENERATION/ENVIRONMENTAL EFFECTS/PERTURBATION/ ARIDITY/FLOODS/RAINFALL-RUNOFF RELATIONSHIPS

17

AHAD, M.

1964

SEDENTARISATION OF NOMADS IN THE BUTANA REGION OF NORTHERN SUDAN.

SOCIETE DE GEOGRAPHIE D EGYPTE, BULLETIN 37:5-33. GA 68D-1118.

WITHIN THE 150,000-ACRE KHASHM-EL-QIRBA PROJECT, 25,000 ACRES WERE ALLOCATED AS COMPENSATION FOR GRAZING RIGHTS LOST BY THE RESETTLEMENT OF 50,000 PEOPLE DISPLACED FROM THE HALFA REGION AS A RESULT OF THE ASWAN HIGH DAM. ATTEMPTS AT PERSUADING NOMADS TO SETTLE THROUGH DEVELOPMENT OF IRRIGATION SCHEMES THAT PROVIDE WATER AND GRAZING ARE BEING MADE, BUT THE CULTURAL ATTACHMENT TO THEIR CAMELS HAS BEEN A STUMBLING BLOCK. THERE IS SOME EVIDENCE THAT THIS IS BEING OVERCOME.

OALS/SUDAN/NOMADS/CAMELS/SETTLEMENTS/ASWAN HIGH DAM/SOCIAL ASPECTS/ GRAZING/IRRIGATION PROGRAMS

18

AXELROD, D.I.

1950

EVOLUTION OF DESERT VEGETATION IN WESTERN NORTH AMERICA.

CARNEGIE INSTITUTION OF WASHINGTON, PUBLICATION 590:215-306.

DESERT VEGETATION OF MODERN CHARACTER DEVELOPED DURING THE TERTIARY PERIOD BY THE GRADUAL ADAPTATION OF MORE MESIC PLANTS TO SLOWLY EXPANDING DRY CLIMATES. SUBTROPICAL AND WARM-TEMPERATE FORESTS DOMINATED OVER THE LOWLANDS OF THE PRESENT DESERT REGION FROM UPPER CRETACEOUS INTO EARLY TERTIARY TIME. TEMPERATE DECIDUOUS AND CONIFER FOREST, ARID SUBTROPICAL FOREST, ARID SUBTROPICAL SCRUB, LIVE OAK WOODLAND, AND CHAPARRAL CHARACTERIZED THESE AREAS DURING THE MIDDLE AND LATER TERTIARY. GRASSLAND AND SCRUB BECAME PROMINENT DURING THE MIDDLE PLIOCENE. THE PRESENT DESERT ENVIRONMENTS OF SUBCONTINENTAL EXTENT MUST BE OF LATEST CENOZOIC AGE. (OALS)

OALS/WGM/NPS-ONS/EVOLUTION/PHYTOGEOGRAPHY/DESERT PLANTS/CLIMATIC-VEGETAL RELATIONSHIPS/GEOGRAPHICAL ORIGIN/DESERTS/SOUTHWEST U.S./ SONORAN DESERT/CHIHUAHUAN DESERT/GREAT BASIN/CLIMATIC CHANGE/SWERVE/ VEGETATION CHANGE

19

AYRES, J.E.

1971

MAN, THE DESERT FARMER. IN HYDROLOGY AND WATER RESOURCES IN ARIZONA AND THE SOUTHWEST 1:373-379.

AMERICAN WATER RESOURCES ASSOCIATION, ARIZONA SECTION/ARIZONA ACADEMY OF SCIENCE, HYDROLOGY SECTION, MEETING, 1971, TEMPE, ARIZONA, PROCEEDINGS.

THE PRE-COLUMBIAN HOHOKAM INDIANS OCCUPIED THE MAJOR RIVER DRAINAGES OF CENTRAL ARIZONA, AND HAVE BEEN THE SUBJECT OF MUCH INTENSE ARCHAEOLOGICAL RESEARCH. EVIDENCE INDICATES THAT THE HOHOKAM BEGAN USING RIVER WATER FOR CROP IRRIGATION ABOUT 300 B.C., AND MODIFIED AND IMPROVED THEIR IRRIGATION SYSTEMS OVER TIME, UNTIL THE MAXIMUM EXTENT OF THESE SYSTEMS WAS ACHIEVED ABOUT 900 A.D. TWO TYPES OF WATER CONTROL SEEM TO HAVE BEEN UTILIZED: (1) THE DIRECT EXPLOITATION OF RIVERS THROUGH THE USE OF IRRIGATION CANALS, (2) INDIRECT USE THROUGH CONTROLLED RUNOFF WITHIN MICRODRAINAGES AT HIGHER ELEVATIONS BEFORE IT REACHED THE RIVERS. AT FIRST, PROBABLY ONLY THOSE PARCELS OF LAND WITH OPTIMAL SOILS AND DRAINAGE WERE USED, BUT APPARENTLY POPULATION INCREASES FOSTERED BY AGRICULTURE ITSELF, COMBINED WITH INCREASING SOCIAL AND POLITICAL COMPLEXITY, NECESSITATED MORE AND MORE EXPLOITATION OF MARGINAL LANDS. EVENTUALLY SOIL PROBLEMS INCREASED IMPOSING SEVERE LIMITATIONS ON AGRICULTURE. THESE INVOLVED SALT AND ALKALI ACCUMULATION DUE TO INADEQUATE DRAINAGE, SOIL DENSITY AND WATERLOGGING. ADDITIONALLY, THE EXTENSION OF CROPPING REQUIRED THE CLEARING OF NATURAL VEGETATION, WHICH RESULTED IN INCREASED EROSION AND DECREASED AVAILABLE NATIVE FOOD RESOURCES FOR PERIODS WHEN CROPS FAILED. THE CULTURE VANISHED COMPLETELY ABOUT 1450 A.D., PROBABLY MAINLY BECAUSE OF THEIR MANNER OF RIVER EXPLOITATION FOR IRRIGATION. MORE RECENT ARCHAEOLOGICAL STUDIES ARE CONCENTRATING NOT ONLY ON RIVER USE BUT ALSO ON RIVER ABUSE. (OALS)

OALS/HISTORY/ARIZONA/IRRIGATION PRACTICES/SONORAN DESERT /SOIL PROPERTIES/SOIL TEXTURE/SALINE SOILS/ARROYOS/RIVER BASINS/ MICROENVIRONMENT /CROP PRODUCTION/ENVIRONMENTAL EFFECTS/ARCHAEOLOGY/ DESICCATION/EROSION/DESERTIFICATION

20

BECKETT, P.H.T./GORDON, E.D.

1966

LAND USE AND SETTLEMENT ROUND KERMAN IN SOUTHERN IRAN.

GEOGRAPHICAL JOURNAL 132(4):476-490. WAERSA (10)1498.

THE KERMAN BASIN, A HIGH ISOLATED PLAIN AREA IN S. IRAN ILLUSTRATES HOW LAND USE AND SETTLEMENT IN A MARGINAL AREA IS CONTROLLED BY CRITICAL ENVIRONMENTAL FACTORS, IN THIS CASE AVAILABILITY OF WATER AND CULTIVABLE SOIL. THERE IS A LIMITED AMOUNT OF GOOD SOIL ROUND THE EDGE OF THE BASIN AND A LIMITED AMOUNT OF WATER IN SHALLOW AQUIFERS WHICH ARE TAPPED BY AN EXPENSIVE TUNNELLING SYSTEM OF CANALS OFTEN SEVERAL MILES LONG, WHICH LEAD WATER UNDER GRAVITY TO SETTLEMENTS. FOUR TYPES OF SETTLEMENT (SHEPARD VILLAGES, MOUNTAIN, FOOTHILL AND PLAIN VILLAGES) ARE DESCRIBED, WITH EXAMPLES OF LAND USE AND CROPS

GROWN. THE HIGH COST OF WATER LEADS LANDLORDS TO CLAIM A VERY HIGH PROPORTION OF CROPS AND DISCOURAGES CULTIVATORS FROM INCREASING PRODUCTION. IMPROVEMENT IN COMMUNICATIONS AND TRADE IN CHEAPER FOODSTUFFS WILL TEND TO UPSET THE LOCAL EQUILIBRIUM BETWEEN PRICES AND WAGES, AND CHEAPER METHODS OF WINNING WATER AND ADVANCES IN FARMING TECHNIQUES ARE NECESSARY IF VILLAGES ARE TO ADAPT TO MODERN CONDITIONS.

OALS/IRAN/SETTLEMENTS/LAND USE/BASINS/QANATS/SOCIAL ASPECTS/WATER RESOURCES DEVELOPMENT

21

BENNETT, H.H./CHAPLINE, W.R.

1928

SOIL EROSION, A NATIONAL MENACE.

U.S. DEPARTMENT OF AGRICULTURE, CIRCULAR 33. 36 P.

PART I BY BENNETT DISCUSSES WASTING AREAS, WITH STATISTICS ON WASTAGE, GEOGRAPHIC EXTENT OF SOIL EROSION IN U.S., EROSION IN DRIER AREAS, RELATION TO FLOOD CONTROL AND WARNINGS OF WHAT MAY HAPPEN IF NOTHING IS DONE TO STOP EROSION. PART II BY CHAPLINE COVERS SOIL EROSION ON WESTERN GRAZING LANDS. DISCUSSION INCLUDES EROSION AGENCIES ON RANGE LANDS INCLUDING NATURAL AGENCIES, FIRES, MINING AND OVERGRAZING; THE SERIOUS EFFECTS OF EROSION INCLUDING FLOOD DAMAGE TO MOUNTAIN VALLEYS, SILTING OF RESERVOIRS AND REDUCED PRODUCTIVITY OF RANGE LANDS. THE LAST PORTION IS DEVOTED TO A DISCUSSION OF WHAT NEEDS TO BE DONE.

OALS/WGM/SOIL EROSION/UNITED STATES/EROSION/EROSION CONTROL/LAND MANAGEMENT/SOIL CONSERVATION/SOIL STABILIZATION/SOIL MANAGEMENT/ WATERSHED MANAGEMENT/FLOOD CONTROL/RANGE MANAGEMENT/GRAZING/ PERTURBATION/BURNING/GULLY EROSION/FLOODS/MINING/SWERVE

22

BENTLEY, H.L.

1898

CATTLE RANGES OF THE SOUTHWEST. A HISTORY OF THE EXHAUSTION OF THE PASTURAGE AND SUGGESTIONS FOR ITS RESTORATION.

U.S. DEPARTMENT OF AGRICULTURE, FARMERS BULLETIN 72:1-32.

THE RANGES OF CENTRAL TEXAS WERE USED TO SHOW WHAT HAPPENED TO THE RANGES AND WHAT COULD BE DONE TO IMPROVE CONDITIONS. IN THE MIDDLE 1800 S GRASS WAS 1 TO 3 FEET HIGH BUT LATER CARRYING CAPACITY DECLINED. WITH THE COMING OF THE RAILROAD, CATTLE AND SHEEP PRICES WENT UP AND SO DID THE HERD SIZE, RESULTING IN OVERGRAZING. MANY RANCHERS EXPLOITED THE PASTURAGE WHILE THEY COULD WHEN CATTLE PRICES CONTINUED TO GO UP. A GENERAL LACK OF INTEREST IN RANGE IMPROVEMENT,

PERIODICAL DROUGHTS, ANIMAL PESTS SUCH AS PRAIRIE DOGS AND JACKRABBITS, AND THE INCREASE OF PRICKLY PEAR AND THORNY SHRUBS ON THE RANGE ACCELERATED THE DEGENERATION OF THE RANGE. (OALS)

OALS/WGM/RANGES/SOUTHWEST U.S./HISTORY/TEXAS/RANGE MANAGEMENT/GRAZING /LIVESTOCK/GRASSES/CARRYING CAPACITY/DROUGHTS/LEPUS/PERTURBATION/ OPUNTIA/SHRUBS/SEEDING/FORAGE SUPPLY/FORAGE PLANTS/VEGETATION CHANGE/ SWERVE

23

BIRAND, H.

1970

DIE VERWUSTUNG DER ARTEMISIA-STEPPE BEI KARAPINAR IN ZENTRAL ANATOLIEN (THE DESTRUCTION OF ARTEMISIA STEPPE NEAR KARAPINAR IN CENTRAL ANATOLIA).

VEGETATIO 20(1-4):21-47. GA 708-1416.

CENTRAL ANATOLIA HAS BEEN GRAZED OR CULTIVATED FOR SEVERAL THOUSAND YEARS AND IS IN NO SENSE A NATURAL LANDSCAPE. THE ORIGINAL SETTLERS, SEEKING RICHER GRAZING IN THE LEE OF MOUNTAINS, LIVED ALONG THE WOODLAND BOUNDARY WHICH THEY SUBSEQUENTLY PUSHED BACK. THE PILLOW-FORM COMMUNITIES FOUND THERE TODAY ARE DEGRADED REMNANTS, DUE TO OVERGRAZING. EVIDENCE FOR THE FORMER POSITION OF THE WOODLAND BOUNDARY IS DISCUSSED, PARTICULARLY THE PRESENCE OF BERBERIS, NOT USED FOR FODDER OR FUEL. SAND WASTE AND ARTEMISIA STEPPE COMMUNITIES ARE DESCRIBED, WITH NOTES ON THE SOIL AND CLIMATE. THE SAND WASTE COMMUNITY IS SALVIA CRYPTANTHA-PHLOMIS ARMENIACA. THE DESTRUCTION OF THE STEPPE BY OVERGRAZING IS DISCUSSED, THE DESTRUCTION LEADING TO A DESERT WASTE.

OALS/ARID LANDS/TURKEY/GRAZING/DESERTIFICATION/PERTURBATION/ SETTLEMENTS/ARTEMISIA/SHEEP(DOMESTIC)/VEGETATION CHANGE/RELICT VEGETATION

24

BLAKE, I.

1969

CLIMATE, SURVIVAL AND THE SECOND-CLASS SOCIETIES IN PALESTINE BEFORE 3000 B.C.

ADVANCEMENT OF SCIENCE 25(126):409-421. GA 720-0473.

SHOWS THAT THERE ARE AREAS PECULIARLY SUSCEPTIBLE TO SMALL CLIMATIC CHANGES; THAT THESE AREAS WERE IMPORTANT IN HUMAN TERMS BETWEEN 7000 AND 3000 B.C.; THAT THERE IS A DEGREE OF CORRELATION BETWEEN CERTAIN ARCHAEOLOGICAL EVIDENCE AND CLIMATIC HYPOTHESES. BEGINS WITH A REGIONALIZATION OF PALESTINE BASED ON CLIMATIC CONSIDERATIONS. DISCUSSES SETTLEMENT PATTERNS AND THE CLIMATIC FLUCTUATIONS, AND CORRELATES SOME OF THE EVIDENCE. CONCLUDES THAT IT IS NOT THE CENTERS OF CIVILIZATION RESPONSIBLE FOR PROGRESS BUT THE GEOGRAPHIC FRINGES SUCCOURING SECOND CLASS SOCIETIES. THE EFFECT OF SMALL

CLIMATIC FLUCTUATIONS IN THE MARGINAL REGION OF PREHISTORIC PALESTINE WAS SIGNIFICANT ENOUGH TO PRECIPITATE A STRUGGLE FOR SURVIVAL WHICH INDIRECTLY DETERMINED THE FUTURE OF THE ENTIRE SETTLED POPULATION.

ARID CLIMATE/CLIMATOLOGY/AGRICULTURE/HISTORY/SOCIAL ASPECTS/ PALESTINE/SETTLEMENTS/SURVIVAL/CLIMATIC CHANGE/ISRAEL/MIDDLE EAST/ OALS

25

BOUGHEY, A.S.

1960

MAN AND THE AFRICAN ENVIRONMENT.

RHODESIA SCIENTIFIC ASSOCIATION, PROCEEDINGS AND TRANSACTIONS 48:8-18.

THE AUTHOR EMPHASIZES THREE MAIN POINTS, FIRST THAT BEFORE THE ADVENT OF MAN, AFRICA WAS COVERED ALMOST IN ITS ENTIRETY BY SOME TYPE OR OTHER OF WOODY VEGETATION, EITHER FOREST, WOODLAND OR SAVANNA; SECOND, THAT WITH THE APPEARANCE OF MAN, ESPECIALLY EUROPEANS WITH MODERN TOOLS OF DESTRUCTION, THIS WOODY VEGETATION EVERYWHERE IS RAPIDLY BEING CONVERTED TO GRASSLAND; THIRD, THAT THIS REPLACEMENT OF FOREST, WOODLAND OR SAVANNA BY GRASSLAND HAS FAR-REACHING BUT AT PRESENT LARGELY INCALCULABLE EFFECTS UPON OTHER FACTORS OF THE ENVIRONMENT, PARTICULARLY ON CLIMATIC FACTORS SUCH AS RAINFALL OR HUMIDITY, ON HYDROLOGICAL FEATURES SUCH AS STREAM FLOW, AND ON PEDOLOGICAL CHARACTERS SUCH AS THE NUTRIENT STATUS OF THE SOIL AND ITS PHYSICAL CONDITION, OR ON THE ACTUAL AMOUNT OF SOIL WHICH REMAINS OVERLYING THE NATIVE BEDROCK.

OALS/AFRICA/DESERTIFICATION/VEGETATION CHANGE/ENVIRONMENTAL EFFECTS/ PERTURBATION/CLIMATIC-VEGETAL RELATIONSHIPS/CLIMATIC CHANGE/GRASSLAND BIOME

26

BOUGHEY, A.S.

1963

INTERACTION BETWEEN ANIMALS, VEGETATION, AND FIRE IN SOUTHERN RHODESIA.

OHIO JOURNAL OF SCIENCE 63:193-209.

IT IS CONCLUDED FROM THESE PRELIMINARY STUDIES THAT MOST OF THE VEGETATION OF THE WANKIE NATIONAL PARK, IN SO FAR AS THE NORTHERN AREAS STUDIED ARE CONCERNED, IS COMPOSED OF SECONDARY COMMUNITIES. THESE SECONDARY COMMUNITIES, WHOSE NATURE IS DETERMINED PRIMARILY BY THE INTENSITY OF BIOTIC OR FIRE FACTORS, APPEAR MOSTLY TO BE MUCH MORE SUITABLE FOR GAME OCCUPATION THAN THE UNDISTURBED EDAPHIC COMMUNITIES OF THE REGION. EACH SECONDARY COMMUNITY APPEARS TO HAVE ASSOCIATED WITH IT A PARTICULAR GROUP OF GAME ANIMALS, MAKING UP A COMPLEX ECOSYSTEM. THE TWO PREDOMINANT VARIABLE ECOLOGICAL FACTORS IN THE ECOSYSTEM ARE ELEPHANT DAMAGE AND BURNING BY GRASS FIRES. THE

OPERATION OF BOTH THESE FACTORS AND THEREFORE THE NATURE OF THE BALANCE WITHIN THE ECOSYSTEM, ARE CLEARLY CONTROLLABLE, AND CAN BE BROUGHT WITHIN A GAME MANAGEMENT POLICY.

OALS/BURNING/CONTROLLED BURNING/PLANT COMMUNITIES/EAST AFRICA/ ECOSYSTEMS/WILDLIFE MANAGEMENT/GRASSLAND BIOME

27

BOX, T.W.

1971

NOMADISM AND LAND USE IN SOMALIA.

ECONOMIC DEVELOPMENT AND CULTURAL CHANGE 19(2):222-228. SWRA W71-10504.

THE CLIMATE OF SOMALIA IS DRY TROPICAL. ANNUAL RAINFALL IS EXTREMELY VARIABLE, RANGING FROM 1-24 INCHES PER YEAR, DIVIDED BETWEEN SPRING AND AUTUMN RAINS. ONLY ABOUT 12 PERCENT OF THE LAND IS CULTIVATABLE, AND LIVESTOCK PRODUCTION, INVOLVING CAMELS, SHEEP, GOATS AND CATTLE, SUPPORTS ABOUT 73 PERCENT OF THE POPULATION. THE SOMALI HERDSMEN HAVE EVOLVED A SYSTEM OF NOMADIC ROTATION OF RANGELAND THAT RESULTS IN A BALANCE BETWEEN RANGE VEGETATION AND ANIMAL NEEDS. IN THE WET SEASON, HERDS ARE SCATTERED ONTO THE RANGES RECEIVING RAINFALL. DURING THE DRY SEASON CLANS ARE CONCENTRATED NEAR THEIR HOME WELLS OVER WHICH THEY HAVE PRIMARY RIGHTS. SCATTERING AGAIN WHEN RAINS REAPPEAR RELIEVES THE GRAZING PRESSURES AROUND THE WATEPHOLES. RECENT STUDIES INDICATE THAT NUMBERS OF HERD ANIMALS ARE INCREASING AND THAT A LARGE PERCENTAGE OF LIVESTOCK PRODUCTION IS BEING SOLD OUTSIDE THE COUNTRY. THERE ARE VARIOUS ESTIMATES INDICATING THAT UP TO 90 PERCENT OF THE HARD CURRENCY COMING INTO THE COUNTRY MAY COME THROUGH SALES OF NOMADIC LIVESTOCK. RECENTLY A NUMBER OF FOREIGN STUDIES HAVE SUGGESTED THE ELIMINATION OF NOMADIC PASTORALISTS AND THEIR RESETTLEMENT AS SEDENTARY FARMERS. THE AUTHOR CONTENDS THAT UNDER THE ECOLOGIC, ECONOMIC AND CULTURAL CONDITIONS NOW EXISTING, NOMADIC LAND USE IS THE BEST UTILIZATION OF THE EXISTING RESOURCE. A SYSTEM OF LAND TENURE PROTECTING AND ENCOURAGING NOMADISM SHOULD BE INITIATED IN CONJUNCTION WITH IMPROVED NOMADIC RANGE MANAGEMENT PROGRAMS. (OALS)

OALS/SOMALIA/NOMADS/LAND USE/LIVESTOCK/GRAZING/WATER HOLES/RANGES/ PASTURES

28

BREED, C.S.

1971

PHYSIOGRAPHIC LIMITATIONS UPON THE USE OF SOUTHWESTERN RIVERS. IN HYDROLOGY AND WATER RESOURCES IN ARIZONA AND THE SOUTHWEST, PROCEEDINGS, ARIZONA SECTION.

AMERICAN WATER RESOURCES ASSOCIATION AND THE HYDROLOGY SECTION-ARIZONA ACADEMY OF SCIENCE, APRIL 22-23, TEMPE, VOL. 1, P. 367-372. SWRA W72-02235.

SOUTHWESTERN RIVERS ARE FEW IN NUMBERS AND LOW IN DISCHARGE. THE PHYSIOGRAPHIC AND CLIMATIC REASONS FOR THIS ARE DISCUSSED. TO THE

EAST OF THE 100TH MERIDIAN. RAINFALL IS RELIABLE AND AGRICULTURE IS STABLE; TO THE WEST, THERE IS A CHRONIC DEFICIT OF WATER. DROUGHTS ARE FREQUENT AND LIFESTYLES MUST BE ACCORDINGLY ADJUSTED. DAM BUILDING RESULTS IN GREATLY INCREASED SILTING BEHIND THE DAM IN BOTH THE RIVER AND ITS TRIBUTARIES AND ACCELERATED CHANNEL EROSION BELOW THE DAM. TOTAL FLOW MUST ALSO DECREASE DUE TO WITHDRAWALS AND INCREASED EVAPORATION FROM RESERVOIRS. THE CORRECTION OF APPARENT ERRORS IN MEASURING THE VIRGIN FLOW OF THE COLORADO RIVER NOW INDICATES THAT THIS FLOW IS ABOUT 15 MAF/YR. CURRENT LEGAL ALLOCATIONS TOTAL 17.5 MAF/YR OF RIVER WATER, INCLUDING THE CENTRAL ARIZONA PROJECT (CAP), WHICH WILL WITHDRAW 1.2 MAF/YR. WHILE THE RIVER IS BEING DAMMED AND OVERALLOCATED BEYOND ALL REASON, THE WATER TABLE IS BEING MINED AT THE ALARMING RATE OF 20 FT/YR. IN CENTRAL ARIZONA, IT HAS DROPPED TO ABOUT 250 FEET BELOW THE SURFACE, AND EVEN IF ALL WITHDRAWALS CEASED IMMEDIATELY, IT WOULD TAKE MANY CENTURIES OF DESERT RAINS BEFORE IT WOULD RETURN TO ITS FORMER LEVEL OF 50 FEET. THE CAP WATER WILL CANCEL ONLY ABOUT 1/2 OF THIS OVERDRAFT ANNUALLY. A GLANCE AT THE PHOENIX AREA TODAY SHOWS THAT RAIN FOLLOWS NEITHER THE FARMERS PLOW NOR THE SUBDIVIDERS BULLDOZER. (OALS)

OALS/ARIZONA/ARID LANDS/COLORADO RIVER BASIN/WATER TABLE/WATER LOSS/ WATER RESOURCES DEVELOPMENT/GEOMORPHOLOGY/DAMS/GROUNDWATER MINING /WATER MANAGEMENT/HYDROLOGY/RIVER BASINS/COLORADO RIVER/POLITICAL ASPECTS

29

BROWN, A.L.

1950

SHRUB INVASION OF SOUTHERN ARIZONA DESERT GRASSLAND.

JOURNAL OF RANGE MANAGEMENT 3(3):172-177. BA(24)35184.

VELVET MESQUITE (PROSOPIS JULIFLORA VELUTINA), BURROWEED (HAPLOPAPPUS TENUISECTUS), AND OTHER SHRUBS HAVE SERIOUSLY REDUCED THE CARRYING CAPACITY ON EXTENSIVE AREAS OF THE DESERT GRASSLAND. TWO THEORIES HAVE BEEN ADVANCED TO EXPLAIN THIS INVASION: 1) GRASSLAND IS A FIRE SUBCLIMAX TO DESERT SHRUB; AND 2) GRASSLAND IS A CLIMAX WHICH HAS BEEN INVADED BY SHRUBS AS A RESULT OF POOR LIVESTOCK MANAGEMENT. ALL SHRUBS EXCEPT BURROWEED AND MESQUITE INCREASED AS MUCH OR MORE UNDER PROTECTION AS UNDER GRAZING DURING AN 18 YEAR STUDY. MESQUITE INCREASED UNDER ALL TREATMENTS BUT INCREASED LEAST UNDER TOTAL PROTECTION. BURROWEED DECREASED SLIGHTLY UNDER TOTAL PROTECTION BUT INCREASED UNDER OTHER TREATMENTS. GRAZING MANAGEMENT WAS SHOWN TO BE ECONOMICALLY UNFEASIBLE AS A CONTROL METHOD. THE INCREASE OF ALL SHRUBS EXCEPT BURROWEED THROUGH 18 YEARS OF TOTAL PROTECTION INDICATES THAT THE DESERT GRASSLAND IS PROBABLY NOT A CLIMAX, BUT WAS MAINTAINED BY SOME FACTOR THAT WAS UNFAVORABLE TO SHRUBS.

OALS/WGM/NPS-ONS/SWERVE/GRASSLAND BIOME/SHRUBS/PLANT INVADERS/ PROSOPIS/PROSOPIS JULIFLORA/FORAGE PRODUCTION/FORAGE LEGUMES/CARRYING CAPACITY/APLOPAPPUS TENUISECTUS/CLIMAX/RANGE MANAGEMENT/ARIZONA/DESERT GRASSLAND/CONTROLLED BURNING/PERTURBATION/SUCCESSION/VEGETATION CHANGE

30

BROWN, L.H.

1971

THE BIOLOGY OF PASTORAL MAN AS A FACTOR IN CONSERVATION.

BIOLOGICAL CONSERVATION 3(2):93-100.

A DISCUSSION OF THE BASIC RELATIONSHIP BETWEEN THE DIETETIC NEEDS OF PASTORAL PEOPLE, THE NUMBERS OF STOCK THEY MUST KEEP TO SUPPLY THESE NEEDS, AND THE PRODUCTIVE CAPACITY OF THE ENVIRONMENT. USUALLY, OVERGRAZING AND EROSION IN PASTORAL AREAS IS ATTRIBUTED TO PRESTIGE OVERSTOCKING, BUT IT IS SHOWN HERE THAT THERE IS A BASIC MINIMUM NUMBER OF ANIMALS REQUIRED TO SUPPORT A HUMAN FAMILY. THIS REQUIREMENT IS ABOUT 3 STANDARD STOCK UNITS EACH OF 500 KILOGRAMS, LIVE-WEIGHT PER HEAD, BUT VARIES FROM 2.5-4.5 ACCORDING TO THE ECOLOGICAL CONDITIONS, AND IS MADE UP OF VARIOUS CLASSES OF STOCK THAT ARE KEPT FOR MEAT OR MILK. WHEN RISING HUMAN POPULATION BECOMES TOO GREAT TO PERMIT EACH FAMILY TO MAINTAIN THIS NECESSARY MINIMUM HERD, DAMAGE TO THE ENVIRONMENT THROUGH OVERSTOCKING BECOMES INEVITABLE. IN ADDITION, BY COMPETING FOR THE AVAILABLE MILK SUPPLY, THE PASTORAL PEOPLES INEVITABLY STARVE THE CALVES AND DEPRESS THE QUALITY OF THEIR STOCK, PARTICULARLY WHERE HUMAN POPULATIONS ARE HIGH. IN MANY AREAS, THE PREVALENT OVERGRAZING SITUATION IS SEEN AS ONE OF HUMAN OVER-POPULATION--REQUIRING THE REMOVAL OF HUMANS, ALTERATION OF THEIR DIETETIC HABITS, AND MERE REDUCTION OF STOCK NUMBERS. METHODS FOR ALLEVIATING THE SITUATION MIGHT INCLUDE PARTIAL DEPENDENCE ON BOUGHT GRAIN, OR SETTLEMENT ON IRRIGATION SCHEMES, BUT NONE ARE EASY OR SHORT-TERM.

OALS/NOMADS/FOOD HABITS/NUTRIENT REQUIREMENTS/FORAGE SUPPLY/LIVESTOCK /FORAGE PRODUCTION/GRAZING/PERTURBATION/ANIMAL DAMAGE/LIMITING FACTORS /ECOLOGY/POPULATIONS/CARRYING CAPACITY/HUMAN BEHAVIOR

31

BRYAN, K.

1928

CHANGES IN PLANT ASSOCIATIONS BY CHANGE IN GROUND-WATER LEVEL.

ECOLOGY 9(4):474-478.

CITES EVIDENCE FOR THE EXISTENCE OF PHREATOPHYTES, AND NOTES CHANGES IN PLANT ASSOCIATIONS ACCOMPANYING CHANNEL-CUTTING AND LOWERED GROUND WATER TABLES. HISTORICAL REPORTS ARE CITED THAT INDICATE THE SANTA CRUZ AND SAN PEDRO RIVERS ONCE CONTAINED MANY CIENEGAS. PROGRESSIVE CHANGES IN THE VEGETATION LED FROM BULRUSH, USING SURFACE WATER, THROUGH THE GRASSES (SACATON) AND COTTONWOODS, USING SHALLOW GROUNDWATER, TO THE DEEP ROOTED MESQUITE (PROSOPIS), USING DEEP GROUNDWATER, FOLLOWING A LOWERING OF THE WATER TABLE. THE FUNDAMENTAL

CAUSE OF ARROYO CUTTING MAY HAVE BEEN DUE TO CHANGE TO A DRIER CLIMATE. IF THIS IS TRUE, OVERGRAZING IS AN ACCESSORY WHICH SET THE DATE AT WHICH CUTTING MIGHT BEGIN. (OALS)

OALS/WGM/NPS-ONS/SWERVE/PHREATOPHYTES/PLANT COMMUNITIES/WATER TABLE/GROUNDWATER/SANTA CRUZ RIVER BASIN/SAN PEDRO VALLEY/RANGE MANAGEMENT/GRAZING/SUCCESSION/PLANT ECOLOGY/RIPARIAN VEGETATION/CHANNEL MORPHOLOGY/PROSOPIS/GRASSES/AQUATIC COMMUNITIES/POPULUS/GULLY EROSION/ARROYOS/EPHEMERAL STREAMS/CLIMATIC CHANGE/ARIZONA/VEGETATION CHANGE

32

BRYAN, K./ALBRITTON, C.C., JR.

1943

SOIL PHENOMENA AS EVIDENCE OF CLIMATIC CHANGES.

AMERICAN JOURNAL OF SCIENCE 241(8):469-490.

DISCUSSES CHARACTERISTICS OF SOILS AND SOIL CONDITIONS THAT CAN BE USED TO PROVIDE PALEOCLIMATOLOGICAL DATA. PARTICULAR SOIL IN DAVIS MOUNTAINS, AUTHORS BELIEVE, RECORDS 3 STAGES OF RELATIVE ARIDITY DURING WHICH CALICHE WAS DEPOSITED IN SUBSOIL, AND TWO INTERVENING STAGES OF MOISTER CLIMATES DURING WHICH CALICHE WAS PARTIALLY OR COMPLETELY DISSOLVED. ADJACENT VALLEYS ARE UNDERLAIN BY 3 BODIES OF ALLUVIUM SEPARATED BY EROSIONAL DISCONFORMITIES. DISPOSITION TOOK PLACE IN HUMID TIMES WHEREAS EROSION TOOK PLACE IN ARID TIMES.

OALS/WGM/SWERVE/CLIMATIC CHANGE/PALEOCLIMATOLOGY/CALICHE/TEXAS/SOUTHWEST U.S./SOIL EROSION/SOIL FORMATION/WEATHERING/SOIL HORIZONS/SOIL PROFILES

33

BRYSON, A.B./BAERREIS, D.A.

1967

POSSIBILITIES OF MAJOR CLIMATIC MODIFICATION AND THEIR IMPLICATIONS: NORTHWEST INDIA, A CASE FOR STUDY.

AMERICAN METEOROLOGICAL SOCIETY, BULLETIN 48(3):136-142.

ON THE BASIS OF FIELD OBSERVATIONS AND THEORETICAL STUDIES IT IS BELIEVED THAT THE DENSE PALL OF LOCAL DUST OVER NORTHWESTERN INDIA AND WEST PAKISTAN IS A SIGNIFICANT FACTOR IN THE DEVELOPMENT OF SUBSIDENCE OVER THE DESERT. ARCHAEOLOGICAL EVIDENCE DERIVED FROM THE NORTHERN PORTION OF THE DESERT WITHIN INDIA SUGGESTS A PATTERN OF INTERMITTENT OCCUPATION WITH THE ROLE OF MAN BEING IMPORTANT IN MAKING THE DESERT. AS MAN HAS MADE THE DESERT, SO THROUGH SURFACE STABILIZATION CAN HE

REDUCE THE DUST AND CONSEQUENTLY MODIFY THE SUBSIDENCE AND PRECIPITATION PATTERNS IN THE REGION. THE SOCIAL CONSEQUENCES OF SUCH CLIMATIC MODIFICATION ARE BRIEFLY CONSIDERED.

INDIA/PAKISTAN, WEST/DUST STORMS/SUBSIDENCE/DEGENERATION/WEATHER MODIFICATION/LAND USE/THAR DESERT/OALS

34

BUDYKO, M.I./DROZDOV, O.A./YUDIN, M.I.

1971

THE IMPACT OF ECONOMIC ACTIVITY ON CLIMATE.

SOVIET GEOGRAPHY: REVIEW AND TRANSLATION 12(10):666-679. TRANSLATED FROM M.I. BUDYKO, ED., SOVREMENNYYE PROBLEMY KLIMATOLOGII. GIDROMETEOIZDAT, LENINGRAD, 1966. SWRA W72-07046.

THE CLIMATIC CONSEQUENCES OF A VARIETY OF HUMAN ACTIVITIES ARE EXAMINED IN TERMS OF THEIR EFFECTS ON LOCAL ENERGY BALANCES. CITIES CONSUME ENERGY AT RAPID RATES, AND LEAD TO INCREASES IN LOCAL AIR TEMPERATURES. THIS EFFECT IS FURTHER HEIGHTENED BY AIR POLLUTION WHICH ATTENUATES OUTGOING LONG-WAVE RADIATION. ADDITIONALLY, THE GREATER SURFACE ROUGHNESS AND HIGHER SENSIBLE HEAT FLUX DURING WARM PERIODS COMBINE TO INTENSIFY VERTICAL CURRENTS AND MAY RESULT IN PRECIPITATION INCREASES. FOREST CANOPIES TEND TO ABSORB MORE SOLAR ENERGY THAN OPEN LAND, WHICH MAINLY HEATS THE CANOPY AND EVAPORATES WATER. THE ABSENCE OF WIND WITHIN THE FOREST AND THE LESSENED SENSIBLE HEAT FLUX TEND TO SMOOTH DIURNAL TEMPERATURE FLUCTUATION. NIGHTTIME COOLING IS MINIMIZED BY ATMOSPHERIC THERMAL STRATIFICATION WHICH HINDERS HEAT EXCHANGE. DEFORESTATION RESULTS IN A DROP IN MEAN ANNUAL AIR TEMPERATURE AND AN INCREASE IN DIURNAL RANGE. IRRIGATION IN THE ARID ZONE PRODUCES SIGNIFICANT CHANGES IN THE HEAT AND WATER EXCHANGE AT THE AIR-GROUND SURFACE. NORMALLY, MOST INCOMING RADIATION IN THE DESERT HEATS THE ATMOSPHERE THROUGH SENSIBLE HEAT FLUX, THE TEMPERATURE OF AIR MASSES RISE AND RELATIVE HUMIDITY DROPS. AS A RESULT OF IRRIGATION, EVAPORATION INCREASES AND THE TEMPERATURE OF THE GROUND SURFACE DECREASES. (OALS)

OALS/ARID LANDS/MICROCLIMATOLOGY /AIR TEMPERATURE/HEAT TRANSFER/ ENERGY BUDGET/HUMIDITY /PRECIPITATION(ATMOSPHERIC)/ENVIRONMENTAL EFFECTS/FORESTS/AIR POLLUTION/CLIMATE/VEGETATION EFFECTS/AIR MASSES/ AIR CIRCULATION/CLIMATIC CHANGE/ADVECTION /ECONOMIC IMPACT/DIURNAL/ VARIABILITY(ENVIRONMENTAL)

35

BUTZER, K.W.

1959

STUDIEN ZUM VOR- UND FRUEHGESCHICHTLICHEN LANDSCHAFTSWANDEL DER SAHARA. III: DIE NATURLANDSCHAFT AEGYPTENS WAEHREND DER VORGESCHICHTE UND DER DYNASTISCHEN ZEIT (STUDIES ON PRE- AND EARLY HISTORIC CHANGES OF SAHARAN LANDSCAPE: III: THE NATURAL LANDSCAPE OF EGYPT DURING THE STONE AGE AND IN DYNASTIC TIMES).

AKADEMIE DER WISSENSCHAFTEN UND DER LITERATUR, MAINZ, MATHEMATISCH-NATURWISSENSCHAFTLICHE KLASSES, ABHANDLUNGEN 2:43-122.

SEASONALLY INUNDATED BASIN LANDS PROBABLY HARBORED A SAVANNA-LIKE VEGETATION DURING THE DRY SEASON WHILE PAPYRUS WERE CONCENTRATED IN LOCALIZED MARSHY HOLLOWS. ON THE LEVEES GROVES OF ACACIA, TAMARISK, SYCAMORE, AND WILLOW GREW WHILE THE NEIGHBORING LOW DESERT REPRESENTED A STEPPE COUNTRY WITH OCCASIONAL GROVES OF TREES. GEOLOGICAL EVIDENCE OF GREATER PRECIPITATION IN NEOLITHIC TIMES (5000-2400 B.C.) IS DESCRIBED IN DETAIL FOR EGYPT. IT IS SUPPORTED BY THE FAUNAL PICTURE. FROM THE PREDYNASTIC TO THE HELLENISTIC PERIOD BOTH THE CLIMATE, THE NATURAL LANDSCAPE AND THE FAUNA CHANGED DRASTICALLY. THERE WAS A CESSATION OF LOCAL RAINFALL AND A REGRESSION OF THE GENERAL FLOOD LEVEL. ABOUT THIS TIME SAND DUNES MOVED IN AND COVERED WIDE STRETCHES OF FORMER ALLUVIUM IN WESTERN MIDDLE EGYPT. VARIABLE GEOLOGICAL PROCESSES OF THE MOST RECENT PAST MUST BE ATTRIBUTED TO THE DEGREE OF EOLIAN ACTIVITY IN THE LIBYAN DESERT AND THE HEIGHT OF THE NILE FLOOD LEVELS.

OALS/NORTH AFRICA/VEGETATION/HISTORY/PALEOCLIMATOLOGY/BIOGEOGRAPHY/ DUNES/CLIMATOLOGY/RIVER BASINS/GEOLOGIC TIME/GEOMORPHOLOGY / ARCHAEOLOGY/ARID LANDS/SAHARA/CLIMATIC GEOMORPHOLOGY /CLIMATIC-VEGETAL RELATIONSHIPS/EGYPT/NILE RIVER/CLIMATIC CHANGE/DESICCATION

36

BUTZER, K.W.

1961

CLIMATIC CHANGE IN ARID REGIONS SINCE THE PLIOCENE. IN L.D. STAMP, ED., A HISTORY OF LAND USE IN ARID REGIONS. UNESCO, PARIS.

ARID ZONE RESEARCH 17:31-56.

THIS IS A COMPREHENSIVE REVIEW OF CLIMATIC CHANGE IN ARID REGIONS SINCE THE PLIOCENE, WITH EMPHASIS ON RECENT CHANGES. THE FIRST SECTION REVIEWS CLIMATE AND GENERAL CIRCULATION. FOLLOWING IS A DISCUSSION OF THE PLUVIALS AND INTERPLUVIALS OF THE PLEISTOCENE: CLIMATE AND CLIMATIC VARIATION OF THE LAST 2,000 YEARS; AND RECENT CLIMATIC FLUCTUATION IN ARID REGIONS, DISCUSSED BY CONTINENTS. THE FINAL SUBSECTION INCLUDES METEOROLOGICAL IMPLICATIONS OF RECENT FLUCTUATIONS AND PROSPECTS OF FUTURE DEVELOPMENTS. THE AUTHOR CONCLUDES THAT THE ULTIMATE CAUSES OF CIRCULATION CHANGES ARE SO FAR BEYOND THE COMPASS OF HUMAN OBSERVATION THAT ALL ATTEMPTS TO FORECAST FUTURE TRENDS ARE PURELY SPECULATIVE OR INTUITIVE AS YET. THE GREAT CLIMATIC SHIFTS OF THE LAST CENTURY INDICATE THE INSTABILITY OF THE PRECIPITATION-EVAPORATION CYCLE IN THE MARGINAL LANDS OF THE

ARID ZONE. THE MEN AGAINST THE DESERT MUST REMAIN AWARE OF THE DYNAMIC CHARACTER OF THE GENERAL ATMOSPHERIC CIRCULATION, THAT CLIMATOLOGICAL MEANS CANNOT EXPRESS A PROCESS SUCH AS WEATHER.

OALS/ARID CLIMATES/SEMIARID CLIMATE/ARID LANDS/HISTORY/CLIMATOLOGY/ METEOROLOGY/WEATHER PATTERNS/DESERTS/PALEOCLIMATOLOGY/CLIMATIC ZONES / DROUGHTS/SYNOPTIC CLIMATOLOGY/GEOLOGIC TIME/ATMOSPHERIC CIRCULATION

37

BUTZER, K.W.

1964

THE SAHARA AND EASTERN AFRICA DURING THE LATE PLEISTOCENE. IN K.W. BUTZER, ENVIRONMENT AND ARCHEOLOGY, AN INTRODUCTION TO PLEISTOCENE GEOGRAPHY, P. 301-316.

ALDINE, CHICAGO.

THE MOST CONSPICUOUS LATE PLEISTOCENE EVENT OF THE SAHARA WAS A MODEST INCREASE IN RAINFALL CORRESPONDING TO PARTS OF THE LAST PLUVIAL. CERTAIN BRIEF PERIODS OF GREATER MOISTURE ARE RECORDED BY WADI ALLUVIATION OF COARSE GRAVELS OR SANDS IN EXISTING WADI CHANNELS, BY THE CREATION OR EXPANSION OF EXISTING LAKES, AND BY POLLEN EVIDENCE OF MEDITERRANEAN TREE SPECIES IN DESERT UPLANDS OF THE INNER SAHARA. THERE IS ALSO EVIDENCE OF INTERVALS WITH GREATER AEOLIAN ACTIVITY, WHEN WIND-BORNE SANDS WERE DEPOSITED (OR REDISTRIBUTED) WELL SOUTH OF THE PRESENT SOUTHERN LIMIT OF MOBILE DUNES. LOCAL STRATIGRAPHIC SEQUENCES ARE CORRELATED TO OTHER AREAS BY INFERENCE. GLACIO-EUSTATIC CORRELATIONS HAVE BEEN MADE ONLY IN THE LIBYAN COASTAL REGIONS, THE NILE VALLEY, THE RED SEA COAST, AND THE SENEGAL DELTA BECAUSE OF LACK OF STRATIGRAPHICALLY MEANINGFUL FAUNA.

OALS/SAHARA/EAST AFRICA/PLEISTOCENE EPOCH/CLIMATIC CHANGE/WIND ACTION /STRATIGRAPHY/GEOCHRONOLOGY/WADIS/GEOGRAPHICAL ORIGIN/LIBYA

38

BUTZER, K.W.

1966

CLIMATIC CHANGES IN THE ARID ZONES OF AFRICA DURING EARLY TO MID-HOLOCENE TIMES. IN WORLD CLIMATE FROM 8000 TO 0 B.C., PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM, P. 72-83.

ROYAL METEOROLOGICAL SOCIETY, LONDON.

THE ARID ZONES OF AFRICA, WHILE ALWAYS SUBJECT TO COMPARATIVELY DRY CLIMATE DURING MORE RECENT GEOLOGICAL TIMES, HAVE EXPERIENCED A SUCCESSION OF MOISTER OR DRIER OSCILLATIONS DURING THE PLEISTOCENE AND HOLOCENE. VARIOUS CLASSES OF PALEOCLIMATIC EVIDENCE ARE REVIEWED BRIEFLY. AVAILABLE EVIDENCE FOR THE SAHARA SUGGESTS THAT A HYPER-ARID OSCILLATION CA. 2350-870 B.C. WAS PRECEDED BY A MOISTER SUB-PLUVIAL PERIOD CA. 5500-2350 B.C., POSSIBLY INTERRUPTED BY ONE OR MORE DRY SPELLS. THERE IS SOME EVIDENCE OF A MOISTER CONDITION DURING THE 7TH MILLENNIUM AND OF A HYPER-ARID CONDITION A MILLENNIUM EARLIER. NONE

OF THESE CHANGES IN PRECIPITATION OR EFFECTIVE MOISTURE CAN BE QUANTITATIVELY DEFINED, AND THERE IS NO EVIDENCE CONCERNING TEMPERATURE CONDITIONS. (OALS)

HOLOCENE EPOCH/OALS/CLIMATIC CHANGE/SAHARA/AFRICA/GEOCHRONOLOGY/ ARIDITY/PALEOCLIMATOLOGY /CLIMATIC GEOMORPHOLOGY

39

BUTZER, K.W./TWIDALE, C.R.

1966

DESERTS IN THE PAST. IN E. S. HILLS, ED., ARID LANDS: A GEOGRAPHIC APPRAISAL, P.127-144.

METHUEN, LONDON. MGA 19.11-481.

DISCUSSIONS OF CRITERIA OF CLIMATIC CHANGE INCLUDING LACUSTRINE CONDITIONS, RIVER TERRACES, PALYNOLOGY, SEDIMENTS AND FOSSIL SOILS, DUNE FORMS, DENDROCHRONOLOGY, AND ARCHAEOLOGY. EMPHASIS IS ON PLUVIAL PERIODS OF THE QUATERNARY.

DESERTIFICATION/CLIMATIC CHANGE/DESERTS/PHYSICAL GEOGRAPHY/ ARCHAEOLOGY/HISTORY/QUATERNARY PERIOD/PLEISTOCENE EPOCH/OALS

40

CAMPBELL, I.A.

1970

CLIMATE AND OVERGRAZING ON THE SHONTO PLATEAU, ARIZONA.

PROFESSIONAL GEOGRAPHER 22(3):132-141. MGA 21.11-446; SWRA W71-04064.

ANALYSIS OF LONG-TERM CLIMATIC TRENDS FOR THE SHONTO PLATEAU REGION, DERIVED FROM DENDROCHRONOLOGIC AND OTHER RECORDS, SHOWS THAT EXTREMELY FAVORABLE VEGETATION GROWTH PERIODS PREVAILED DURING THE FIRST TWO DECADES OF THE 20TH CENTURY, FOLLOWING DRY CONDITIONS OF THE MIDDLE AND LATE 19TH CENTURY. THROUGHOUT THE 1930S AND MOST OF THE 1940S, DRY CONDITIONS PREVAILED AGAIN. UPON THIS AREA OF FLUCTUATING ECOSYSTEMS AN ADDITIONAL ECOLOGICAL IMBALANCE WAS IMPOSED FOR OVER A CENTURY THROUGH THE INTRODUCTION OF SHEEP RAISING AND CONSEQUENT HEAVY GRAZING. ON THE BASIS OF AVAILABLE DATA ON STOCK-CARRYING CAPACITIES OF THE PLATEAU, AND THE EXTENT OF OVERGRAZING, CHANGES IN THE VEGETATION COVER (E.G., INTRODUCTION OF THE RUSSIAN THISTLE; GULLYING, BEGINNING IN THE EARLY 1900S; AND CLIMATIC VARIATIONS, ESPECIALLY MAJOR PRECIPITATION FLUCTUATIONS) HAVE ACCOUNTED FOR DETERIORATION OF THE VEGETATION MORE THAN OVERGRAZING PER SE.

VEGETATION CHANGE/OALS/WGM/ARIZONA/DENDROCHRONOLOGY/WEATHER PATTERNS/ SEMIARID CLIMATE/ECOSYSTEMS/GRAZING/DEGENERATION/UNDESIRABLE PLANTS/ SALSOLA/GULLY EROSION/CARRYING CAPACITY/CLIMATIC CHANGE/PLANT COVER/ CLIMATIC-VEGETAL RELATIONSHIPS

41

CASEY, H.E.

1972

SALINITY PROBLEMS IN ARID LANDS IRRIGATION: A LITERATURE REVIEW AND SELECTED BIBLIOGRAPHY.

U.S. OFFICE OF WATER RESOURCES RESEARCH, WASHINGTON, D.C., WATER RESOURCES SCIENTIFIC INFORMATION CENTER, OWRR 14-01-0001-1616, WRSIC 73-300. 300 P. AVAILABLE NTIS AS PB-214 172. SWRA W73-03910.

A BIBLIOGRAPHY OF 986 REFERENCES WITH ACCOMPANYING TEXT THAT REVIEWS BROADLY SUCH TOPICS AS WATER QUALITY AND THE TOTAL DRAINAGE BASIN, SALINITY PREVENTION AND SOIL RECLAMATION, SALINITY AND DROUGHT EFFECTS ON PLANTS, SOIL AND WATER SALTS, BASIC WATER BALANCE PROBLEMS IN RELATION TO IRRIGATION, PLUS A PERSPECTIVE ON HISTORIC SALINITY PROBLEMS AND AN OVERVIEW. SOCIOECONOMIC ASPECTS ARE CONSIDERED, WITH REFERENCE TO THE COLORADO RIVER BASIN AS AN EXAMPLE IN MICROCOSM. THERE IS DISCUSSION OF CURRENTLY USED AND POTENTIAL AMELIORATIVE TECHNIQUES THAT WOULD RENDER CURRENT METHODS MORE EFFICIENT, RAISE PRODUCTIVITY ENOUGH TO CONSTITUTE A BREAKTHROUGH AND HIGH-HUMIDITY LOW WATER-USE GREENHOUSE STRUCTURE THAT WOULD RADICALLY ALTER CURRENT ARID LANDS IRRIGATION METHODS. RECOMMENDATIONS INCLUDE: (1) STANDARD RECLAMATION PRACTICES SHOULD BE USED WHEREVER POSSIBLE; (2) INTENSIVE RESEARCH AND DEVELOPMENT EFFORTS SHOULD BE ENCOURAGED ON CROP GROWING METHODS CONSTITUTING MAJOR DEPARTURES FROM STANDARD IRRIGATION PRACTICES, OR THOSE THAT INCREASE CROP TOLERANCE TO SALINE WATERS AND SOILS; (3) NATIONAL GOVERNMENTS SHOULD RECOGNIZE THE SERIOUSNESS OF SALINITY PROBLEMS AND ACCORD THEM HIGH SCIENTIFIC PRIORITY; (4) INDEPENDENT INSTITUTES FOR INFORMATION-GATHERING AND RESEARCH DIRECTION SHOULD BE ESTABLISHED AND SUPPORTED; AND (5) PLANNING CONSTRUCTION AND LARGE-SCALE RECLAMATION PROJECTS SHOULD BE SUSPENDED OR SLOWED UNTIL A MORE BALANCED ASSESSMENT OF THEIR VIABILITY CAN BE DETERMINED.

OALS/BIBLIOGRAPHIES/SALINITY/SALTS/IRRIGATION WATER/WATER QUALITY/ ARID LANDS/SALT TOLERANCE/LEACHING/SALINE WATER/IRRIGATION EFFECTS/ IRRIGATION PRACTICES/LAND RECLAMATION/WATERSHEDS(BASINS)/COLORADO RIVER BASIN/MEXICAN WATER TREATY/GREENHOUSES/SOUTHWEST U.S./PLANT INJURY

42

CHABERT, A.

1966

LES NOMADES SAHARIENS ET LE DEVELOPPEMENT ECONOMIQUE.

REVUE ECONOMIQUE DE MADAGASCAR 1:61-80.

SAHARA SOCIETY IS AT PRESENT IN A STAGE OF TRANSITION BETWEEN TWO TYPES OF CIVILIZATION: THE TRADITIONAL AND THE TECHNICAL. CONTACT WITH THE WESTERN WORLD AND PARTICULARLY THE SPREAD OF MECHANIZATION HAS ACCELERATED THE ECONOMIC, SOCIAL AND PSYCHOLOGICAL CRISIS. THE PROBLEM OF THE ECONOMIC DEVELOPMENT OF THE NOMADS IS ACUTE. THERE ARE TWO POSSIBILITIES: SETTLEMENT THROUGH INDUSTRIALIZATION OR PASTORALISM IN A MODERNIZED SETTING. ONLY THE LATTER CAN PRESERVE THE TRADITIONAL FEATURES OF NOMADISM WHILE INTEGRATING IT INTO THE MODERN ECONOMY.

OALS/NOMADS/SAHARA/SETTLEMENTS/SOCIAL ASPECTS

43

CHARLEY, J.L./COWLING, S.W.

1968

CHANGES IN SOIL NUTRIENT STATUS RESULTING FROM OVERGRAZING AND THEIR CONSEQUENCES IN PLANT COMMUNITIES OF SEMI-ARID AREAS.

ECOLOGICAL SOCIETY OF AUSTRALIA, PROCEEDINGS 3:28-38. SWRA W70-07761

IT IS ARGUED THAT LIMITATION OF ESSENTIAL NUTRIENTS AND NOT WATER ARE THE LIMITING FACTORS IN PLANT BIOMASS IN ARID REGIONS. NITROGEN CONTENT IN THE SOIL IS LARGELY A FUNCTION OF NODULATING LEGUMES AND INPUT IS LIMITED BY ACTIVE PLANT GROWTH. ARID REGIONS HAVE LESS NITROGEN THAN HUMID REGIONS AND AUSTRALIA HAS LESS THAN OTHER ARID REGIONS. SOIL ORGANIC MATTER IS LOW IN DESERTS BECAUSE SPARSE RAINFALL LIMITS DECAY PERIODS. SOIL PHOSPORUS IS LITTLE AFFECTED BY CLIMATIC FACTORS OR NATURAL INPUT AND IS MAINLY GOVERNED BY THE PHOSPHORUS CONTENT OF PARENT MATERIAL. SOILS AT THE LOWER END OF THE FERTILITY SPECTRUM SHOW THE GREATEST RELATIVE ACCUMULATION OF NUTRIENTS NEAR THE SURFACE AND ORGANIC CARBON, TOTAL NITROGEN AND AVAILABLE PHOSPHORUS AND NITRATE PRODUCTION FALL AWAY SHARPLY WITH INCREASING DEPTH. MEASUREMENTS IN A SALTBUSH COMMUNITY SHOWED THAT THE TOTAL LEAF AND FRUIT LITTER FALL FOR A YEAR WAS GREATER THAN THE WEIGHT OF LEAF HELD IN THE COMMUNITY, INDICATING A HIGH RECYCLING RATE. IN AN OVERGRAZED AREA WITH A SOIL TRUNCATION OF 10 CM DUE TO EROSION IT WAS ESTIMATED THAT 35 PERCENT OF TOTAL CIRCULATING NITROGEN, 45 PERCENT OF ORGANIC MATTER AND GREATER THAN 22 PERCENT OF AN ALREADY LOW PHOSPHORUS IS LOST. EFFORTS TO FURROW THE AREA AND ELIMINATE GRAZING DID NOT INCREASE PLANT PRODUCTION. IT WAS CONCLUDED THAT PROBABLY NOT LACK OF RAINFALL BUT LOW PHOSPHORUS LIMITED NITROGEN PRODUCTION AND THE WHOLE SYSTEM OF NUTRIENTS IS DELICATELY BALANCED BY A HIGH RECYCLING PROCESS WHICH IS EASILY DISTURBED. (OALS)

DESERT PLANTS/ORGANIC MATTER/NITROGEN/PHOSPHORUS/ON-SITE DATA COLLECTIONS/SOIL-WATER-PLANT RELATIONSHIPS/NUTRIENT REQUIREMENTS/ EROSION/PRODUCTIVITY/AUSTRALIA/ATRIPLEX/BIOMASS/LIMITING FACTORS/ LITTER/PERTURBATION/OALS

44

CHEVALIER, A.

1934

LES PLACES DEPOURVUES DE VEGETATION DANS LE SAHARA ET LEUR CAUSE SOUS LA RAPPORT D ECOLOGIE VEGETALE.

ACADEMIE DES SCIENCES, PARIS, COMPTES RENDUS 194(5). 480P.

CHEVALIER CONCLUDES THAT THE DECREASE OF VEGETATION IN THE SAHARA IS DUE NOT ONLY TO DESICCATION, BUT ALSO TO THE DEVASTATING ACTIONS OF MEN AND DOMESTIC ANIMALS.

OALS/WGM/SAHARA/VEGETATION CHANGE/DESERTIFICATION/PERTURBATION/HUMANS /DOMESTIC ANIMALS/DESICCATION/GRAZING

45

CHRISTENSEN, E.M./HUTCHINSON, M.A.

1965

HISTORICAL OBSERVATION ON THE ECOLOGY OF RUSH AND TOOELE VALLEYS, UTAH.

UTAH ACADEMY OF SCIENCES ARTS AND LETTERS, PROCEEDINGS 42(1):90-105. BA(49)76282.

RUSH AND TOOELE VALLEYS WERE OCCUPIED ORIGINALLY LARGELY BY PRAIRIE AND MEADOW VEGETATION, ON BOTH UPLANDS AND MOIST LOWLANDS. NORTHERN DESERT SHRUBS WERE PRESENT, BUT WERE DOMINANT ONLY IN LOCAL AREAS. UTAH JUNIPER COMMUNITIES WERE PRESENT IN PARTS OF THE VALLEYS, AND SALT DESERT SHRUBS OCCURRED ON SALTY SOILS. MARSH VEGETATION OCCURRED NEAR THE SOUTHERN SHORE OF GREAT SALT LAKE IN TOOELE VALLEY, AROUND RUSH LAKE IN RUSH VALLEY, AND OTHER LOWLAND AREAS. DISTRIBUTION OF THE PLANT COMMUNITIES OF THE SALINE AND WET SOILS OF THE TOOELE VALLEY AS MAPPED BY KEARNEY AND HIS ASSOCIATES (1914) REPRESENTS THE DISTRIBUTION OF PRE-SETTLEMENT VEGETATION. AFTER THE FIRST, SECOND OR THIRD DECADES FOLLOWING SETTLEMENT, EVIDENT CHANGES TOOK PLACE IN THE VEGETATION OF THE BENCH LANDS AND UPLANDS OF THESE VALLEYS. THE GRASSES BECAME LESS ABUNDANT AND THE WOODY SPECIES, PARTICULARLY SAGEBRUSH AND SHADSCALE BECAME MORE ABUNDANT. ORIGINAL VEGETATION HAD BEEN SO GREATLY MODIFIED BY 1929 THAT DUST STORMS OCCURRED COMMONLY DURING THE 1930S. IN LOCAL AREAS PERENNIAL GRASSES BECAME MORE ABUNDANT RECENTLY AND DUST STORMS ARE NO LONGER FREQUENT, BUT THE CONTINUED INVASION OF JUNIPER IS EVIDENT, PARTICULARLY IN RUSH VALLEY. MOST OF THE BENCHLANDS AND FOOTHILLS ARE DOMINATED PRESENTLY BY SAGEBRUSH, SHADSCALE, AND OTHER DESERT SHRUBS, AND THE MOST ABUNDANT GRASS IS THE EXOTIC ANNUAL CHEATGRASS. TOOELE VALLEY WAS THE HABITAT FOR A VARIETY OF MAMMALS AT THE TIME OF SETTLEMENT. SEVERAL BIRDS, FISH, AND INSECTS WERE ALSO REPORTED.

OALS/WGM/HISTORY/UTAH/VEGETATION/TOOELE VALLEY/GRASSES/DESERT PLANTS/ /SHRUBS/PLANT COMMUNITIES/SOIL TYPES/PLANT DISTRIBUTION/ARTEMISIA/ ATRIPLEX/JUNIPERUS/FLOODS/DUST STORMS/PLANT INVADERS/BROMUS/WILDLIFE HABITATS

46

CHRISTENSEN, E.M./JOHNSON, H.B.

1964

PRESETTLEMENT VEGETATION AND VEGETATIONAL CHANGE IN THREE VALLEYS IN CENTRAL UTAH.

BRIGHAM YOUNG UNIVERSITY, PROVO, UTAH, SCIENCE BULLETIN, BIOLOGICAL SERIES 4(4). 16 P.

HISTORICAL INFORMATION, SURVEY RECORDS, AND RELICT VEGETATION WERE USED AS SOURCES OF DATA FOR DETERMINING THE NATURE OF THE PRESETTLEMENT VEGETATION OF PAVANT, ROUND AND JUAB VALLEYS IN UTAH. SIGNIFICANT CHANGES IN PRESETTLEMENT VEGETATION HAD OCCURED BY 1900. IN GENERAL, THERE WAS A TRANSITION FROM A PREDOMINANCE OF PERENNIAL GRASSES TO ONE OF SAGEBRUSH THROUGHOUT THE FOOTHILLS AND BENCHLANDS, AND GRASSES BECAME LESS ABUNDANT IN THE SHRUB COMMUNITIES. AFTER 1870 JUNIPER INCREASED IN DENSITY AND INVADED AREAS THAT WERE FORMERLY

DOMINATED BY GRASSES. THESE CHANGES ACCOMPANIED THE USE OF THESE AREAS AS RANGELANDS FOR LIVESTOCK. IN THIS CENTURY SEVERAL EXOTIC SPECIES HAVE BECOME IMPORTANT. THE RATES OF MIGRATION SINCE 1870 OF TWO GROUPS OF UNSTABLE SAND DUNES IN PAVANT VALLEY WERE DETERMINED TO BE 53.5 AND 60.9 FEET PER YEAR.

OALS/UTAH/GREAT BASIN/VEGETATION/GRAZING/GRASSES/DUNES/WIND EROSION/ SHRUBS/JUNIPERUS/HISTORY /SEMIARID CLIMATE/GRASSLAND BIOME/NORTHERN DESERT SHRUB/VEGETATION CHANGE/PERTURBATION

47

CHRISTODOLOU, D.

1970

SETTLEMENT IN AGRICULTURE OF NOMADIC, SEMI-NOMADIC AND OTHER PASTORAL PEOPLE: BASIC CONSIDERATIONS FROM A WORLD VIEW.

LAND REFORM, LAND SETTLEMENT AND CO-OPERATIVES 1:40-51. WA 13(1)1361.

ATTENTION IS GIVEN TO BASIC FACTORS, PARTICULARLY THOSE WHICH ARE PERTINENT TO THE EFFORTS TO SETTLE NOMADIC, SEMI-NOMADIC AND OTHER PASTORAL PEOPLE IN AGRICULTURE. SUCH SETTLEMENT SHOULD BE BASED ON A THOROUGH UNDERSTANDING OF THE SOCIAL DYNAMICS OF THE GROUP INVOLVED AND THE ECONOMIC FEASIBILITY OF THE SETTLEMENT PROPOSED, AND A HARMONIZATION OF THE TWO. OBJECTIVES SHOULD BE IMAGINATIVELY AND PERCEPTIVELY IDENTIFIED AND REALISTICALLY SET OUT AND EVERY EFFORT MADE TO BUILD INTO THE NEW SYSTEM BOTH DYNAMISM AND GUARANTEES FOR PROGRESS TOWARD GREATER SOCIAL AND ECONOMIC EQUALITY AND WIDE PARTICIPATION IN DECISION-MAKING AND MANAGEMENT OF GROUP AFFAIRS.

OALS/NOMADS/SETTLEMENTS/HUMAN BEHAVIOR/TRANSHUMANCE/AGRICULTURE/ LIVESTOCK/MIGRATION/SOCIAL ASPECTS/ECONOMICS/COST-BENEFIT ANALYSIS/ CULTURAL GEOGRAPHY/GRAZING

48

CLOUDSLEY-THOMPSON, J.L.

1970

ANIMAL UTILIZATION. IN H.E. DREGNE, ED. ARID LANDS IN TRANSITION.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, PUBLICATION 90:57-72. SWRA W71-07815.

THE MAJOR RESOURCE OF DESERT AREAS IS AN INEXHAUSTIBLE SUPPLY OF SOLAR ENERGY. WHILE MANY DESERT REGIONS MAY BE MADE TO BLOOM WITH WATER APPLICATIONS, THE MAJOR WATER SUPPLY, GROUNDWATER, IS EXTREMELY VARIABLE IN QUALITY AND PROSPECTS FOR ITS UTILIZATION IN MOST DESERT REGIONS ARE FAR FROM ENCOURAGING. THE POTENTIALITIES OF ANIMAL SCIENCE IN AREAS, PARTICULARLY THE SAHARA DESERT, WHERE WATER IS UNAVAILABLE FOR IRRIGATION, ARE REVIEWED. MAN S EFFECTS ON THE DESERTS HAVE BEEN PRIMARILY DESTRUCTIVE, PARTICULARLY THROUGH OVERGRAZING, SO THAT DESERTS OF LOW PRODUCTIVITY HAVE EXPANDED INTO LARGER DESERTS OF VIRTUALLY ZERO PRODUCTIVITY. IN THE SAHARA, GOATS INCREASE PRODUCTIVITY, BUT CONTRIBUTE FURTHER TO ECOLOGICAL

DEGRADATION. INCREASING WATER-HOLE DISTRIBUTION SHOULD INCREASE HERBIVORE GRAZING RANGES, BUT THIS IS OF LIMITED PRACTICALITY. THE CURRENT POLICIES OF VARIOUS GOVERNMENTS LEADING TO PERMANENT SETTLEMENT OF NOMADS IS PROBABLY ILL-CONCEIVED, SINCE IN MANY AREAS, NOMADISM IS THE ONLY POSSIBLE FORM OF DESERT EXPLOITATION. DESERT IRRIGATION PROJECTS LEAD TO CRITICAL MEDICAL ENTOMOLOGICAL PROBLEMS SUCH AS MALARIA, TRACHOMA, AMOEBIC DYSENTARY AND BILHARZIASIS. THEY ALSO ENCOURAGE DESERT LOCUSTS, WHICH MAY BE SELF-DEFEATING IN TERMS OF EXPANDING CROP PRODUCTION. POSSIBLE GRAZING SPECIES WHICH MAY ENHANCE ANIMAL PRODUCTION ARE CONSIDERED, AND THE MAJOR POSSIBILITIES APPEAR TO BE THE CAMEL AND THE OSTRICH. HUMAN FOOD HABITS PRESENTLY SEEM TO PRECLUDE THE CAMEL. INADEQUATE FAMILIARITY WITH DESERT ECOLOGY IS RESULTING IN A NUMBER OF QUESTIONABLE DEVELOPMENT SCHEMES THAT ARE SERVING ONLY TO EXPAND THE DESERT. ADDITIONALLY, MORE ACCOUNT MUST BE TAKEN OF CULTURAL PECULIARITIES, WHICH MAY ALSO SERVE TO DEFEAT MANY PROJECTS. (OALS)

OALS/ARID LANDS/XEROPHILES/GRAZING/HERBIVORES/SOCIAL ASPECTS/ANIMAL BEHAVIOR/WATER UTILIZATION/DAMS/ECOLOGY/WATER BALANCE/GOATS/CATTLE/ FOOD HABITS/ECOSYSTEMS/LAND USE/WATER QUALITY/PRODUCTIVITY/SETTLEMENTS /POLITICAL ASPECTS/IRRIGATION EFFECTS/SAHARA/NOMADS/CAMELS/OSTRICHES

49

CLOUDSLEY-THOMPSON, J.L.

1971

RECENT EXPANSION OF THE SAHARA.

INTERNATIONAL JOURNAL OF ENVIRONMENTAL STUDIES 2(1):35-39. GA 728-1231.

DURING THE LATE PLEISTOCENE, THE SAHARA EXPERIENCED BOTH PLUVIAL AND INTER-PLUVIAL PERIODS WHEN THE CLIMATE WAS SUCCESSIVELY WETTER AND DRIER THAN IT IS TODAY. AT THE END OF THE PLEISTOCENE THE REGIONS BORDERING ITS SOUTHERN EDGE WERE RICHLY SUPPLIED WITH LAKES AND RIVERS. THESE DRIED UP BETWEEN 7000 AND 3500 B.P. AS THE CLIMATE BECAME PROGRESSIVELY DRIER AND WARMER. SUBSEQUENT IMPOVERISHMENT OF THE FLORA AND FAUNA HAS BEEN DUE ALMOST ENTIRELY TO HUMAN ACTIVITIES: BAD AGRICULTURE, FELLING TREES FOR FUEL, AND OVERGRAZING BY DOMESTIC STOCK. 34 REFERENCES. (AUTHOR)

OALS/SAHARA/DESERTIFICATION/CLIMATIC CHANGE/PERTURBATION/GRAZING/ ENVIRONMENTAL EFFECTS/DEGENERATION

50

CLOUDSLEY-THOMPSON, J.L./CHADWICK, M.J.

1964

LIFE IN DESERTS.

G.T. FOULIS, LONDON; DUFOUR, PHILADELPHIA. 218 P.

VARIOUS ECOLOGICAL AND PHYSIOLOGICAL MECHANISMS OF PLANT AND ANIMAL ADAPTATION TO DESERT ENVIRONMENTS ARE DISCUSSED. THE DESERT ENVIRONMENT IS DESCRIBED, FOLLOWED BY SECTIONS ON FLORA (INJURY,

TOLERANCE, EVASION, AVOIDANCE, ETC.) AND FAUNA (PHYSIOLOGICAL ADAPTATIONS OF INVERTEBRATES AND VERTEBRATES). THE FINAL SECTION DEALS WITH THE DESERT COMPLEX (I.E., THE MAZE OF BIOLOGICAL INTERRELATIONSHIPS, COMBINED WITH CLIMATIC AND TOPOGRAPHIC FACTORS). (OALS)

OALS/WGM/NPS-ONS/DESERTS/PHYSIOLOGICAL ECOLOGY/ANIMALS/PLANT PHYSIOLOGY/ANIMAL PHYSIOLOGY/ENVIRONMENT/ADAPTATION/VEGETATION/ TOPOGRAPHY/CLIMATE/DROUGHT TOLERANCE/CLIMATIC-VEGETAL RELATIONSHIPS/ BIOGEOGRAPHY/BIOCLIMATOLOGY/DESERT BIOME

51

COLLIER, F./DUNDAS, J.

1937

THE ARID REGIONS OF NORTHERN NIGERIA AND THE FRENCH NIGER COLONY.

EMPIRE FORESTRY REVIEW 16(2):184-194.

THE AUTHORS ATTEMPT TO CAST DOUBT ON THE EMPHASIS PLACED DURING THE 1930S ON THE THREATENED DESICCATION AND DESERT ENCROACHMENT IN THE AREA, POINTING OUT THAT THE REGION FORMS THE BORDERLAND OF AN ANCIENT NATURAL DESERT THAT HAS FLUCTUATED IN EXTENT WITH SLOW CHANGES IN WORLD CLIMATE. THEY FIND NO EVIDENCE OF A LOWERING WATER-TABLE OR OF ANY ADVANCE OF SAND. THEY PLACE THE CAUSES OF DESERTIFICATION OF THE SAHARA TO THE NORTH TO ECONOMIC FACTORS, BELIEVING THE REAL DANGER TO THE REGION SOUTH OF THE SAHARA TO BE NOT DESERT ENCROACHMENT BUT DEVELOPMENT OF AN INTENSIVE AGRICULTURE THAT THE NATURAL ENVIRONMENT CANNOT SUPPORT. THEY CALL FOR SUCH REMEDIES AS PROPER LAND USE MANAGEMENT AND CLOSER COOPERATION WITH GOVERNMENTAL AGENCIES ON POLICIES AFFECTING AGRICULTURE, LIVESTOCK, WATER SUPPLIES, AND CONSERVATION. (OALS)

OALS/NIGER/NIGERIA/DESICCATION/DESERTIFICATION/LAND USE/LIVESTOCK/ PERTURBATION

52

COOPER, C.F./JOLLY, W.C.

1969

PRECIPITATION MODIFICATION IN SEMIARID AND ARID REGIONS. IN C.F. COOPER AND W.C. JOLLY, ECOLOGICAL EFFECTS OF WEATHER MODIFICATION, A PROBLEM ANALYSIS, P. 22-33.

UNIVERSITY OF MICHIGAN, SCHOOL OF NATURAL RESOURCES. SWRA W70-09959.

WEATHER MODIFICATIONS IN SEMIARID AND ARID AREAS WILL BE AIMED TOWARD INCREASING PRECIPITATION IN AGRICULTURAL AND MUNICIPAL AREAS AND INCREASING MOUNTAIN SNOWFALL TO AUGMENT DOWNSTREAM RUNOFF. THE EFFECTS OF THESE PRECIPITATION CHANGES ON VARIOUS ECOSYSTEMS INVOLVED ARE EXAMINED. THE SPECIES DIVERSITIES OF NATURAL GRASSLANDS ARE REMARKABLY STABLE AS SHOWN BY RESPONSES TO THE DROUGHT OF THE 1930 S

AND TO ARTIFICIAL PRECIPITATION EXPERIMENTS. THE DOMINANT SPECIES COMPOSITION VARIES OVER TIME AND SPACE WITH RAINFALL ACCORDING TO NATURAL VEGETATIONAL MOSAIC SELF-REGULATING MECHANISMS, WHICH MAY ALSO BE INFLUENCED BY GRAZING INTENSITY AND SELECTIVITY. MAMMALIAN POPULATIONS WILL RESPOND TO WEATHER MODIFICATIONS AS COMPLEX FUNCTIONS OF VEGETATIONAL CHANGES. A CRUCIAL POINT IS THAT WEATHER MODIFICATION INVOLVING CLOUD SEEDINGS IS UNLIKELY TO ALLEVIATE SEVERE DROUGHTS SINCE THEY ARE ASSOCIATED WITH AIR PATTERNS WHICH INHIBIT CLOUD FORMATION. THE 10-14 INCH AVERAGE ANNUAL RAINFALL RANGE IS CRITICAL TO STREAM BEDS SINCE VARIATIONS ON EITHER SIDE OF IT WILL EFFECT CHANGES IN RUNOFF FLOW AND SEDIMENT YIELD ALTERING STREAM CHANNEL CHARACTERISTICS. (OALS)

OALS/WEATHER MODIFICATION/ARID LANDS/ARID CLIMATE/SEMIARID CLIMATE/ RUNOFF/PRECIPITATION(ATMOSPHERIC)/DROUGHTS/ENVIRONMENTAL ENGINEERING/ ECOLOGY/WATER YIELD IMPROVEMENT/CLOUD SEEDING/ARTIFICIAL PRECIPITATION

53

COOPERRIDER, C.K./HENDRICKS, B.A.

1937

SOIL EROSION AND STREAM FLOW ON RANGE AND FOREST LANDS OF THE UPPER RIO GRANDE WATERSHED IN RELATION TO LAND RESOURCES AND HUMAN WELFARE.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 567. 88 P.

THEORIES THAT CLIMATIC AND GEOLOGIC CHANGES HAVE CAUSED ACCELERATED RUNOFF AND EROSION DO NOT SEEM TENABLE. HISTORICAL EVIDENCE SHOWS THAT THE RECENT GENERAL DECLINE OF WATERSHED LANDS AND RESOURCES BEGAN DURING THE 1880S FOLLOWING THE IMPAIRMENT OF THE NATURAL VEGETATION COVER PRINCIPALLY THROUGH OVER-GRAZING AND ALSO THROUGH WANTON TIMBER CUTTING, MAN CAUSED FIRES, PROMISCOUS WAGON TRAILING, AND UNJUDICIOUS DRY FARMING. A COMPARISON OF VEGETATION, SOILS, AND EROSION UNDER GOOD AND POOR LAND MANAGEMENT.

OALS/WGM/SOIL EROSION/STREAMFLOW/RANGES/RIO GRANDE VALLEY/WATERSHED MANAGEMENT/HISTORY/GRAZING/BURNING/VEGETATION/SOIL TYPES/EROSION/ NATURAL RESOURCES/LAND USE/LAND MANAGEMENT/DEGENERATION

54

COSTELLO, D.F./TURNER, G.T.

1941

VEGETATION CHANGES FOLLOWING EXCLUSION OF LIVESTOCK FROM GRAZED RANGES.

JOURNAL OF FORESTRY 39(3):310-315.

THE STUDY WAS BASED ON EXAMINATION OF PROTECTED AREAS, CEMETERIES, MUNICIPAL WATERSHEDS AND PERMANENT ENCLOSURES INCLUDING 29 TWO ACRE FENCED ENCLOSURES ON THE CENTRAL PLAINS EXPERIMENTAL RANGE. THE MOST EVIDENT DIFFERENCE BETWEEN GRAZED AND UNGRAZED AREAS WAS IN THE DENSITY OF VEGETATION, WITH GRASSES GENERALLY DENSER UNDER NO GRAZING. WEEDS HAD GREATER DENSITIES UNDER PROTECTION IN MOST INSTANCES.

BECAUSE PLANTS WERE ABOUT THE SAME INSIDE AND OUT. THE DIFFERENCES BETWEEN OUTSIDE AND INSIDE OF PROTECTED AREAS, ARE INFLUENCED BY CONDITIONS AT TIME OF ENCLOSURE, SIZE OF PROTECTED AREA, TIME, RODENTS AND OTHER WILDLIFE, CLASS OF LIVESTOCK, TYPE OF VEGETATION, DISTURBANCES, LOCATION ON GRAZING UNIT, CLIMATIC CYCLES, AND OTHER FACTORS.

OALS/WGM/SWERVE/UNGRAZED/VEGETATION CHANGE/DENSITY/VEGETATION/ PERTURBATION/GRAZING/FORAGE GRASSES/GRASSES/WEEDS/COLORADO/WYOMING

55

COTTAM, W.P.

1929

MAN AS A BIOTIC FACTOR ILLUSTRATED BY RECENT FLORISTIC AND PHYSIOGRAPHIC CHANGES AT THE MOUNTAIN MEADOWS, WASHINGTON COUNTY, UTAH.

ECOLOGY 10:361-363.

THE MOUNTAIN MEADOWS ABOUT 10 MILES LONG BY A MILE WIDE, WERE FORMERLY CLOTHED WITH A VARIETY OF LUXURIANT GRASSES, AND FRESH WITH NUMEROUS SPRINGS AND CLEAR WATER. OVERGRAZING, WHICH STARTED DEEP WASHES IN THE LOWER MARGIN, WAS FOLLOWED IN 1880, AFTER 10 YEARS OF DROUGHT, BY AN UNUSUAL FLOOD RESULTING FROM A RAIN ON TOP OF 3 FEET OF SNOW. A WASH 30 FEET DEEP WAS CUT THROUGH THE ENTIRE LENGTH OF THE MEADOW. THE DRY CONDITIONS RESULTING FROM THIS DRAINAGE TRANSFORMED THE AREA INTO A DRY SAGEBRUSH ASSOCIATION.

OALS/WGM/SWERVE/UTAH/GRAZING/GULLY EROSION/RANGE MANAGEMENT/ PERTURBATION/ARTEMISIA/VEGETATION CHANGE/DESERTIFICATION

56

COTTAM, W.P./EVANS, F.R.

1945

A COMPARATIVE STUDY OF THE VEGETATION OF GRAZED AND UNGRAZED CANYONS OF THE WASATCH RANGE, UTAH.

ECOLOGY 26(2):171-181.

TWO CANYONS IN THE WASATCH MOUNTAINS NEAR SALT LAKE CITY WERE COMPARED; RED BUTTE CANYON HAD BEEN PROTECTED FROM GRAZING FOR 40 YEARS, WHILE EMIGRATION CANYON HAD BEEN GRAZED HEAVILY SINCE SETTLEMENT IN 1847. EVIDENCE POINTS TO THE COMPLETE SUBSTITUTION OF THE ORIGINAL GRASS TYPE IN EMIGRATION CANYON TO ONE WITH UNPALATABLE SHRUBS AND BROMUS TECTORUM WHILE RED BUTTE CANYON HAS MAINTAINED A RICH PLANT COVER INCLUDING TEN NATIVE GRASSES NOT FOUND IN EMIGRATION CANYON. SHEET AND GULLY EROSION ARE PROMINENT IN EMIGRATION CANYON.

OALS/WGM/SWERVE/UTAH/GRAZING/UNGRAZED/SHEET EROSION/GULLY EROSION/ VEGETATION CHANGE/PERTURBATION/LAND MANAGEMENT/VEGETATION/VEGETATION COVER/RANGE MANAGEMENT

57

COTTAM, W.P./STEWART, G.

1940

PLANT SUCCESSION AS A RESULT OF GRAZING AND MEADOW DESICCATION BY EROSION SINCE SETTLEMENT IN 1862.

JOURNAL OF FORESTRY 38(8):613-626.

RECORD OF VEGETATION CHANGE SINCE 1862 IN MOUNTAIN MEADOWS VALLEY, WASHINGTON COUNTY, UTAH. DEPLETION OF COVER ALLOWED TORRENTIAL RAINS TO CUT A DEEP WASH IN 1884. WET AND DRY MEADOWS ONCE DOMINATED BY JUNCUS, SEDGES AND GRASSES ARE NOW SAGEBRUSH, RABBITBRUSH AND JUNIPER.

OALS/WGM/SWERVE/SUCCESSION/UTAH/GRAZING/HISTORY/EROSION/SOIL EROSION/ DESICCATION/MOISTURE DEFICIT/PERTURBATION/VEGETATION CHANGE/ARTEMISIA/ CHRYSOTHAMNUS/JUNIPERUS

58

COUPLAND, R.T.

1958

THE EFFECTS OF FLUCTUATIONS IN WEATHER UPON THE GRASSLANDS OF THE GREAT PLAINS.

BOTANICAL REVIEW 24(5):273-317.

WHEN DROUGHT IS OF SUFFICIENT DURATION TO CAUSE THE DEATH OF NATIVE SPECIES BY DESICCATION, A CONSIDERABLE MODIFICATION IN THE FLORISTIC COMPOSITION OF THE VEGETATION RESULTS. SOME SPECIES ARE ABLE TO SURVIVE BY GOING INTO DROUGHT DORMANCY. REDUCTION IN BASAL COVER, HEIGHT, FORAGE YIELD AND SEED PRODUCTION ARE CHARACTERISTIC OF SPECIES UNDERGOING DROUGHT CONDITIONS, EVEN OF SHORT DURATION, WHILE DEPTH OF ROOTING IS REDUCED DURING DRY PERIODS OF LONGER DURATION. EFFECTS OF DROUGHT ARE NOT LIMITED TO THOSE OF DESICCATION. WHERE LAYERS OF DUST ARE DEPOSITED, MOISTURE PENETRATION MAY BE SO AFFECTED THAT THE HABITAT IS TRANSFORMED AND OCCUPIED BY OTHER SPECIES; VEGETATION CHANGES IN THE GREAT PLAINS RESULTING FROM THE DROUGHT OF THE 1930 S ARE DISCUSSED AND RELATED TO THE RECOVERY PERIOD AND THE DROUGHT OF THE EARLY 1950 S. A COMPLETE DESCRIPTION OF A VEGETATION TYPE SHOULD INCLUDE AN INDICATION OF THE EXTENT TO WHICH IT MAY PROGRESS IN THE DIRECTION OF FAVORING THE MID GRASSES DURING MOIST PERIODS AND THE SHORT GRASSES DURING XERIC ONES. OTHERWISE THE SAME COMMUNITY MAY BE VARIOUSLY CHARACTERIZED BY DIFFERENT WORKERS AT DIFFERENT TIMES.

OALS/WGM/SWERVE/CLIMATIC CHANGE/DROUGHTS/DROUGHT TOLERANCE/SEMIARID CLIMATE/SHORTGRASS/SHORT GRASSES/GRASSLAND BIOME/MID GRASSES/ VEGETATION TYPES/PLAINS/GREAT PLAINS/ENVIRONMENT/VEGETATION CHANGE

59

DARLING, F.F./FARVAR, M.A.

1972

ECOLOGICAL CONSEQUENCES OF SEDENTARIZATION OF NOMADS. IN M.T. FARVAR AND J.P. MILTON, EDS., THE CARELESS TECHNOLOGY: ECOLOGY AND INTERNATIONAL DEVELOPMENT, P. 671-682.

NATURAL HISTORY PRESS, N.Y. 1030 P.

NOMADIC PASTORALISM IS AN ADAPTIVE WAY OF LIFE FOR PEOPLES IN THE GREAT ARID AREAS OF THE WORLD: THE INTERIOR ASIAN STEPPES, SOUTHWEST ASIA AND THE ARAB NEAR EAST. SURVEYS IN THE SAHARA INDICATE THAT LIVING STANDARDS OF NOMADS ARE HIGHER THAN THOSE OF SEDENTARY POPULATIONS. NOMADIC STRAINS OF SHEEP, IN IRAN, TEND TO BE LARGER AND MORE PRODUCTIVE THAN SEDENTARY VILLAGE STRAINS. FOR A VARIETY OF POLITICAL REASONS (CONTROL, TAXATION, PROGRESS), MANY GOVERNMENTS HAVE FORCIBLY ATTEMPTED TO SETTLE NOMADS. THIS HAS FREQUENTLY LED TO DRASTIC STOCK LOSSES, OVERGRAZING AROUND SETTLEMENTS, AND A LOSS OF ENERGY AND RESISTANCE TO ENDEMIC DISEASE ON THE PART OF THE NOMADS. DEVELOPMENT SCHEMES ARE CONCEIVED BY ECONOMISTS AND AGRICULTURAL SCIENTISTS RATHER THAN ECOLOGISTS AND NOMADS. NOMADIC PASTORALISM CAN BE A COMPLEX AND EFFICIENT FORM OF LAND USE. YET, IN THE DETERMINATION TO CHANGE A WAY OF LIFE, COUNTRIES HAVE NOT REALIZED THE COMPLEX RELATIONSHIP BETWEEN ECOLOGICAL, CULTURAL AND ECONOMIC FACTORS.

OALS/NOMADS/CARRYING CAPACITY/SOCIAL ASPECTS/ARABIAN DESERT/MIDDLE ASIA/SAHARA/ECONOMIC IMPACT/POLITICAL ASPECTS/GRAZING/ECONOMIC DEVELOPMENT/ENVIRONMENTAL EFFECTS/LIVESTOCK/IRAN/ADAPTATION/HUMAN DISEASES/SETTLEMENTS

60

DAUBENMIRE, R.F.

1951

AFFORESTATION PROBLEMS IN ARID NORTH AMERICA.

INTERNATIONAL UNION OF BIOLOGICAL SCIENCES, SERIES B(9):81-83.

DROUGHT HAS PROVEN THE KEY FACTOR IN AFFORESTATION OF ARID LANDS. SUCCESS DEPENDS UPON THE DEGREE TO WHICH ADVANTAGE IS TAKEN OF (1) COARSE SOILS WHICH FAVOR DEEP ROOTED TREES, (2) DEPRESSIONS IN TOPOGRAPHY WHICH SLIGHTLY INCREASE AVAILABLE MOISTURE AND DECREASE TRANSPIRATION, (3) SLOPES DIRECTED AWAY FROM SUN AND WIND, AND (4) AVOIDANCE OF SOILS WITH HIGH SALINITY, CALCIUM CARBONATE, ETC.

ARID CLIMATE/OALS/WGM/REFORESTATION/AFFORESTATION/LAND RECLAMATION/ SOUTHWEST U.S./GREAT BASIN/SOIL TYPES/SLOPE EXPOSURE/MICROENVIRONMENT/ DROUGHTS/TREES/WOODY PLANTS/SWERVE

61

DITTMER, H.J.

1951

VEGETATION OF THE SOUTHWEST--PAST AND PRESENT.

TEXAS JOURNAL OF SCIENCE 3(3):350-355. BA(26)33737.

THE PRESENT VEGETATION OF THE SOUTHWEST IS REVIEWED. A SURVEY OF HISTORICAL RECORDS, PRINCIPALLY FROM THE MIDDLE OF THE 19TH CENTURY, INDICATES THAT THE SOUTHWEST HAD A MUCH MORE EXTENSIVE GRASSLAND VEGETATION ON ITS PLAINS AND MESAS THAN IT DOES TODAY. VEGETATIVE CHANGES ARE EXPLAINED AS THE RESULT OF RECENT LAND USE.

OALS/WGM/SWERVE/VEGETATION/SOUTHWEST U.S./HISTORY/GRASSLAND BIOME/ DESERT GRASSLAND/VEGETATION CHANGE/RANGE MANAGEMENT/ARIZONA/NEW MEXICO /TEXAS/LAND USE/PERTURBATION

62

DORT, W., JR./JONES, J.K., JR. EDS.

1970

PLEISTOCENE AND RECENT ENVIRONMENTS OF THE CENTRAL GREAT PLAINS. A SYMPOSIUM.

UNIVERSITY OF KANSAS, LAWRENCE, DEPARTMENT OF GEOLOGY, SPECIAL PUBLICATION 3. 433 P. MGA 23.7-7.

IN THIS COLLECTION OF PAPERS PREPARED FOR A SYMPOSIUM ORGANIZED TO SUMMARIZE STUDIES DEALING WITH ANTHROPOLOGY, BOTANY , GEOLOGY, AND ZOOLOGY IN CENTRAL U.S.A., ENVIRONMENTAL FACTORS ARE TREATED EXTENSIVELY. RADIOCARBON DATING, POLLEN ANALYSIS OF SEDIMENTS, AND OTHER TECHNIQUES USED IN THESE STUDIES PROVIDE SIGNIFICANT RELATIONSHIPS BETWEEN ANTRHOPOLOGICAL, GEOLOGICAL, AND ZOOLOGICAL DEVELOPMENTS OVER PAST CENTURIES, AND CLIMATOLOGICAL FEATURES AND TRENDS. THE 23 COMPREHENSIVE PAPERS CONTAINED IN THIS BOOK ARE GROUPED IN SECTIONS ENTITLED EARTH SCIENCES AND CLIMATE, ANTHROPOLOGY, BOTANY, AND ZOOLOGY.

OALS/PALEOCLIMATOLOGY/SEMIARID CLIMATE/GREAT PLAINS/PALYNOLOGY/ CLIMATOLOGY /ANTHROPOLOGY/ECOLOGY/BIOGEOGRAPHY/GEOLOGY/CLIMATIC GEOMORPHOLOGY/GEOLOGIC TIME

63

DORTIGNAC, E.J.

1963

RIO PUERCO: ABUSED BASIN. IN C. HODGE AND P.C. DUISBERG, EDS., ARIDITY AND MAN.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, PUBLICATION 74:507-515.

THE HISTORY OF THIS BASIN IS AN EXAMPLE OF MAN S FAILURE TO LIVE IN HARMONY WITH SOIL, TOPOGRAPHY, VEGETATION AND CLIMATE. THE HISTORY OF

DROUGHTS, SETTLEMENT AND GRAZING ARE VIEWED IN RELATION TO A SEQUENCE OF EVENTS THAT LED TO THE BREAKDOWN IN THE CLIMATE-SOIL-VEGETATION EQUILIBRIUM. THIS IN TURN RESULTED IN AN EROSION CYCLE WITH RESULTANT GULLY-DISSECTED ALLUVIUM AND SEDIMENTATION OF THE RIO GRANDE. MUCH OF THE IRRIGATED LAND WAS DESTROYED AND ABANDONED. COST OF RECLAMATION MAY BE PROHIBITIVE, BUT SOME REVEGETATION IS IN PROGRESS. THE AUTHOR LEAVES US WITH THE QUESTION, COULD THIS DETERIORATION HAVE BEEN PREVENTED.

WATERSHEDS(BASINS)/OALS/SOUTHWEST U.S./ARID LANDS/RANGE MANAGEMENT/ NEW MEXICO/RIVER BASINS/RIO GRANDE RIVER/EROSION/GULLY EROSION/SOIL EROSION/SEDIMENTATION/HISTORY/DEGENERATION/DROUGHTS/SETTLEMENTS/ GRAZING/SOIL-PLANT-WATER RELATIONSHIPS/PERTURBATION

64

DOUGLASS, A.E.

1914

A METHOD OF ESTIMATING RAINFALL BY THE GROWTH OF TREES.

AMERICAN GEOGRAPHICAL SOCIETY, BULLETIN 46(5):321-335.

THIS CLASSIC STUDY INTRODUCED THE TECHNIQUE OF RELATING TREE RING GROWTH TO PAST CLIMATIC PHENOMENA. STUDIES CENTERED IN FLAGSTAFF AND PRESCOTT, ARIZONA ON THE YELLOW PINE (PINUS PONDEROSA). RING GROWTH IS CORRELATED WITH YEARLY MEANS OF EFFECTIVE PRECIPITATION, AND PROBLEMS OF INTERPRETATION AND ERROR ARE DISCUSSED. 500 YEAR CURVES WERE DRAWN FOR FLAGSTAFF IN ORDER TO SEARCH FOR CLIMATIC CYCLES. CYCLIC OCCURRENCES OF 33, 21, AND 11 YEAR PERIODS ARE DISCUSSED. THE 11-YEAR CYCLE CORRESPONDS TO SUN SPOT CYCLES AND SEVERAL METEOROLOGICAL PHENOMENA IN COASTAL CALIFORNIA.

OALS/ARIZONA/CLIMATOLOGY/PINUS PONDEROSA/ANALYTICAL TECHNIQUES/ PALEOCLIMATOLOGY/DENDROCHRONOLOGY/CLIMATIC CHANGE

65

DOUGRAMEJI, J./KAUL, R.N.

1971

REPORT ON THE POSSIBILITIES OF RECLAMATION OF SAND DUNES AND PROPOSED FUTURE RESEARCH.

INSTITUTE FOR APPLIED RESEARCH ON NATURAL RESOURCES, ABU GHRAIB, IRAQ, TECHNICAL REPORT 37. 14 P.

SHIFTING CLAY AND SAND PARTICLES HAVE RESULTED IN AN IMBALANCE BETWEEN HUMAN AND ANIMAL POPULATIONS, AND PLANT, WATER AND LAND RESOURCES. THE DEPLETION PROCESS HAS A CYCLICAL EFFECT ACCELERATED DURING DROUGHT YEARS. SAND AND CLAY OR PSEUDO SAND DUNES ARE CLASSIFIED BY COMPOSITION, DEPTH OF BLOWN SOIL, PARTICLE SIZE DISTRIBUTION AND MOISTURE CHARACTERISTICS TO INDICATE SOURCE. MOVEMENT OF SAND IS IN A SOUTH-EASTERLY DIRECTION AS A RESULT OF THE PREVAILING NORTH-WESTERLY WINDS. THE SOCIO-ECONOMIC CONSEQUENCES OF THE LOSS OF TOP SOIL ARE SHOWN BY THE POOR CROP YIELD, LOWER PRODUCTION OF LOCAL LIVESTOCK INDUSTRY AND A HIGH MAINTENANCE COST OF IRRIGATION AND COMMUNICATION SYSTEMS. AMONG THE FACTORS AFFECTING

SOIL DRIFT BY THE WIND ARE DROUGHT, OVER EXPLOITATION OF NATURAL VEGETATION THROUGH EXCESSIVE GRAZING AND IMPROPER CULTURAL OPERATIONS DURING AGRICULTURAL USE, AND LEAVING DREDGE MATERIAL ALONG CANALS. RESEARCH HAS OFFERED SOME POSSIBLE REMEDIES TO THIS PROBLEM: IMPROVED CULTURAL PRACTICES FOR FARMING, AND THE STABILIZATION OF SHIFTING DUNES BY PHYTORECLAMATION AND MECHANICAL TREATMENT. (OALS)

OALS/BARCHANS/SAND DUNES/LAND RECLAMATION/CLAYS/PARTICLE SIZE/SOIL EROSION/SOIL MANAGEMENT/SOIL STABILIZATION/SOIL MOISTURE/ENVIRONMENTAL EFFECTS/DESERTIFICATION/WIND EROSION/IRAQ/CROP PRODUCTION/LIVESTOCK/ SOIL-WATER-PLANT RELATIONSHIP/DROUGHTS/MECHANICAL CONTROLS/ARID LANDS

66

OREGNE, H.E.

1969

INTERNATIONAL ARID LANDS CONFERENCE.

NATURE AND RESOURCES 5(3):7-12. SWRA W71-03340.

A CENTRAL OBSERVATION OF THIS SUMMARY IS THE EXPANSION OF DESERT AREAS THROUGHOUT THE WORLD BECAUSE OF HUMAN MISMANAGEMENT. EXISTING ARID AREAS HAVE GENERALLY DETERIORATED IN TERMS OF SOIL, WATER AND PLANT LIFE. A MAJOR FACTOR IS OVERGRAZING. DEVELOPMENT PLANS IN ARID LANDS HAVE USUALLY INVOLVED INCREASED WATER SUPPLIES FOR AUGMENTED AGRICULTURAL PRODUCTION. THIS CONCEPT OF ARID LAND DEVELOPMENT WAS CHALLENGED ON SEVERAL GROUNDS. (1) CONSTRUCTION PROJECTS RECEIVE MORE DETAILED PLANNING THAN THE AGRICULTURAL SYSTEMS THEY ARE DESIGNED TO SUPPLY. (2) HIGH INTENSITY DESERT IRRIGATION SCHEMES REQUIRE HIGH LEVELS OF FARMING SKILLS AND MAINTENANCE CAPITAL. (3) INCREMENTS IN PER CAPITA INCOME RESULTING FROM AGRICULTURAL DEVELOPMENT ARE SMALL. (4) TOURISM, MINING, PASTORALISM, LOW WATER-USE INDUSTRY AND OTHER INCOME-PRODUCERS MAY BE MUCH MORE DESIRABLE. POPULATION PRESSURES MUST BE ALLEVIATED OR NO PROGRESS WILL BE POSSIBLE. SOCIOLOGICAL AND ECONOMIC FACTORS UNIQUE TO THESE AREAS, PARTICULARLY EDUCATION, HAVE BEEN NEGLECTED. THE 3 SEPARATE MAJOR ARID AREAS OF THE WORLD ARE DISCUSSED AND NATIONAL AND INTERNATIONAL MEANS OF ATTACKING THEIR PROBLEMS ARE SUGGESTED. (OALS)

OALS/DESERTIFICATION/PERTURBATION/DESERTS/DEGENERATION/NATURAL RESOURCES/LAND MANAGEMENT/SOCIAL ASPECTS/ECONOMIC DEVELOPMENT/ IRRIGATION PROGRAMS

67

DUFOUR, J.

1971

THE PROBLEM OF COLLECTIVELY OWNED LAND IN TUNISIA.

LAND REFORM, LAND SETTLEMENT AND CO-OPERATIVES 1:38-51. WA 13(4)5001.

A CHARACTERISTIC OF THE LAND TENURE SYSTEM IN TUNISIA IS THE SURVIVAL OF A COLLECTIVE FARMING SYSTEM DIRECTLY DESCENDED FROM AN ECONOMY INTRODUCED IN THE 11TH AND 12TH CENTURIES. SOCIAL AND LAND TENURE ORGANIZATION IS BASED ON THE BREAKDOWN OF BEDOUIN SOCIETY INTO SOCIAL

AND TERRITORIAL GROUPS CONTROLLING TRACTS OF LAND WHICH THEIR MEMBERS USE. THE FUNCTIONAL ENTITY, FROM THIS POINT OF VIEW, IS NOT THE TRIBE, BUT A SMALLER UNIT KNOWN AS A FRACTION, WHICH UNDERLIES ALL BEDOUIN SOCIETIES IN THE MAGHREB. DETAILS ARE PRESENTED OF THE SOCIAL ORGANIZATION, LAND TENURE ORGANIZATION, WAY OF LIFE, STRUCTURAL EVOLUTION IN THE NORTH, CENTER AND SOUTH, DELIMITATION OF LANDS, AND CO-OPERATIVE EXPERIENCE. IT IS CONCLUDED THAT AT THE INSTITUTIONAL LEVEL, SUCH PROBLEMS AS THE LEGAL STATUS OF LAND AND THAT OF CO-OPERATIVES AND THEIR MEMBERS ARE FINDING A SOLUTION WHICH SEEMS SATISFACTORY INASMUCH AS IT CORRESPONDS TO SOCIAL AND TENURIAL REALITIES. HOWEVER, THE MANY PROBLEMS IN THIS FIELD REMAINING UNSOLVED ARE NOT CONFINED TO THE SITUATION ON THE COLLECTIVE LANDS, BUT NEED ACTION AT THE NATIONAL LEVEL.

OALS/NOMADS/CULTURAL GEOGRAPHY/LAND MANAGEMENT/TUNISIA /AFRICA/ HISTORY/SOCIAL ORGANIZATION/TRANSHUMANCE/POPULATIONS /DISTRIBUTION PATTERNS/SAHARA/LAND USE

68

DUNIN-BARKOVSKIY, L.V.

1968

THE WATER PROBLEM IN THE DESERTS OF THE USSR.

SOVIET GEOGRAPHY: REVIEW AND TRANSLATION 9(6):458-468. SWRA W70-01215.

A REGIONAL REVIEW OF EXISTING AND PLANNED IRRIGATION PROJECTS IN THE DESEPT ZONE OF THE SOVIET UNION ENVISAGES THE USE OF WATER FROM THE SIBERIAN STREAMS IN THE NORTHERN SECTION OF THE DESERT ZONE. FOR INCREASED WATER SUPPLIES IN THE SOUTH, THE AUTHOR LOOKS TO OTHER POTENTIAL SOURCES SUCH AS ARTIFICIAL INCREASES OF PRECIPIATATION IN THE MOUNTAINS OF CENTRAL ASIA, ELIMINATION OF WILD GROWTHS OF WATER-LOVING PLANTS, AND TECHNOLOGICAL ADVANCES THAT WILL MAKE POSSIBLE THE ECONOMICAL DESALTING OF WATER FROM SALT LAKES AND OF MINERALIZED SUBSURFACE WATERS.

USSR/WATER RESOURCES DEVELOPMENT/DESALINATION/SALINE WATER/WEATHER MODIFICATION/IRRIGATION PROGRAMS/DIVERSION/WATER SUPPLY/WATER MANAGEMENT/ARTIFICIAL PRECIPITATION/OALS

69

ESPINAL T., L.S./MONTENEGRO M., E.

1963

FORMACIONES VEGETALES DE COLOMBIA, MEMORIA EXPLICATIVA SOBRE EL MAPA ECOLOGICO (PLANT FORMATIONS OF COLOMBIA, DESCRIPTIVE ACCOUNT OF THE ECOLOGIC MAP).

INSTITUTO GEOGRAFICA AGUSTIN CODAZZI, BOGOTA, DEPARTAMENTO AGROLOGICO.

THE AUTHORS HAVE CLASSIFIED THE VEGETATION OF COLOMBIA ACCORDING TO THE HOLDRIDGE LIFE ZONE SYSTEM. THIS VOLUME, THAT ACCOMPANIES THE ECOLOGICAL MAPS, DESCRIBES EACH FORMATION AS TO EXTENT, CLIMATE,

TOPOGRAPHY, VEGETATION, SOILS AND UTILIZATION. IN SEVERAL OF THE DRIEST FORMATIONS, OVERGRAZING OF GOATS AND SHEEP, FIRES, AND UNCONTROLLED CUTTING HAVE DESTROYED THE NATIVE VEGETATION.

SOUTH AMERICA/ARID LANDS/CARRYING CAPACITY/GOATS/SHEEP/VEGETATION/ CLIMATIC ZONES/LIFE ZONES/PERTURBATION/DENUDATION/COLOMBIA/ DESERTIFICATION/OALS

70

FILALI, M. EL

1967

THE ECONOMIC AND SOCIAL DEVELOPMENT OF NOMADIC POPULATIONS BEFORE AND AFTER THEY HAVE BECOME SETTLED. IN M.R. EL GHONEMY, ED., LAND POLICY IN THE NEAR EAST, P. 38-52.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME. WAERSA (10)311.

A BRIEF EXAMINATION IS MADE OF THE MAIN CHANGES AFFECTING THE STRUCTURE OF NOMADISM IN N. AFRICA AND THE NEAR EAST. NOMADISM SEEMS ANACHRONISTIC TODAY, THE REMNANT OF A MARGINAL SOCIAL SYSTEM IN A STATE OF UPHEAVAL, AND A TYPE OF ECONOMY LESS AND LESS IN TUNE WITH THE EVER-GROWING NEEDS OF MANKIND. THIS ANACHRONISM ONLY AGGRAVATES THE ECONOMIC BACKWARDNESS OF EMERGING COUNTRIES AND EVERYWHERE REQUIRES THE ENERGETIC INTERVENTION OF GOVERNMENTS AND PARTICULARLY OF DEVELOPMENT AUTHORITIES. PART 1 LISTS THE MEASURES REQUIRED FOR RAISING, ON A CONTINUING BASIS, THE STANDARD OF LIVING OF THE NOMADS AND PREPARING THEM FOR SETTLED FARMING. THIS CHANGEOVER TO A SEDENTARY ECONOMY, WHEREVER THE PROCESS HAS BEGUN MORE OR LESS SPONTANEOUSLY, POINTS NOT SO MUCH TO A GOAL PER SE AS TO THAT WILL TO CHANGE WITH WHICH THE MAJORITY OF NOMADIC PEOPLES ARE NOW IMBUED. THESE MEASURES RELATE TO ECONOMIC, SOCIAL, SETTLEMENT, AND ADMINISTRATIVE ASPECTS OF THE SITUATION. PART II EXAMINES SPECIFIC MEASURES OF ACCELERATING THE PROCESS OF, AND ADAPTATION TO, CHANGE.

OALS/NOMADS/MIDDLE EAST/LAND RESOURCES/SETTLEMENTS/HUMAN BEHAVIOR/ POLITICAL ASPECTS/SOCIAL ASPECTS/ECONOMIC DEVELOPMENT

71

FLEAGLE, R.G. ED.

1969

WEATHER MODIFICATION; SCIENCE AND PUBLIC POLICY.

UNIVERSITY OF WASHINGTON PRESS, SEATTLE. 147 P.

PAPERS PRESENTED TO THE NATURAL RESOURCES PUBLIC POLICY SEMINAR AT THE UNIVERSITY OF WASHINGTON, PLANNING FOR WHICH WAS STIMULATED BY THE VIEW THAT IMPORTANT PUBLIC POLICY ISSUES IN THE FIELD OF WEATHER MODIFICATION HAD NOT YET BEEN ADEQUATELY EXAMINED AND THAT RESOLUTION OF THESE ISSUES MUST BE BASED ON UNDERSTANDING OF THE SCIENTIFIC AND TECHNICAL POSSIBILITIES, AND EQUALLY ON UNDERSTANDING THE ADMINISTRATIVE, LEGAL, ECONOMIC, AND POLITICAL CONSTRAINTS THAT SURROUND THE SUBJECT. CONSENSUS WAS THAT TECHNICAL ACTIVITIES SHOULD

NOT BE UNDERTAKEN UNTIL THEIR CONSEQUENCES ARE UNDERSTOOD AND THAT THEY MUST BE PLANNED AND CARRIED OUT IN A MANNER RESPONSIBLE TO ALL CONCERNED. (OALS)

OALS/WEATHER MODIFICATION/LEGAL ASPECTS/SOCIAL ASPECTS/ENVIRONMENTAL ENGINEERING/POLITICAL ASPECTS

72

FLINT, R.F.

1959

PLEISTOCENE CLIMATES IN EASTERN AND SOUTHERN AFRICA.

GEOLOGICAL SOCIETY OF AMERICA, BULLETIN 70(3):343-373.

PLEISTOCENE CLIMATES IN THE SOUTHERN HALF OF AFRICA ARE INDICATED BY EVIDENCE OF LAKES IN REGIONS NOW DRY, ANCIENT SOILS FOR WHOSE DEVELOPMENT THE CLIMATE IS NOW TOO DRY OR TOO WET, INACTIVE WIND-BLOWN SAND NOW COVERED BY VEGETATION, AND SIGNS OF FORMER GLACIATION.

OALS/AFRICA/PLEISTOCENE EPOCH/ARID LANDS/SANDS/PALEOCLIMATOLOGY/ CLIMATIC GEOMORPHOLOGY/GEOLOGIC TIME/RELICT LANDFORMS/CLIMATIC CHANGE/ SOUTH AFRICA

73

FLOHN, H.

1971

ETUDE DES CONDITIONS CLIMATIQUES DE L AVANCE DU SAHARA TUNISIEN (INVESTIGATIONS ON THE CLIMATIC CONDITIONS OF THE ADVANCEMENT OF THE TUNISIAN SAHARA).

WORLD METEOROLOGICAL ORGANIZATION, TECHNICAL NOTE 116.

INCREASING AGRICULTURAL ACTIVITIES IN THE SEMI-ARID BOUNDARY ZONE OF THE SAHARA IN TUNISIA HAVE INTRODUCED CHANGES IN NATURAL CONDITIONS THAT MAY BE PERMANENT. THIS REPORT DESCRIBES WATER-BUDGET FACTORS, CHARACTERIZED BY THE BALANCE BETWEEN PRECIPITATION, EVAPOTRANSPIRATION, RUNOFF, AND CHANGE IN GROUNDWATER STORAGE. ON A LONG-TERM BASIS AND UNDER NATURAL CONDITIONS, THE LATTER TWO FACTORS APPROACH ZERO. BY CHANGING NATURAL CONDITIONS, THERE IS A VERY REAL RISK OF UPSETTING THE BALANCE. NO LONG-TERM UPWARD OR DOWNWARD TREND HAS BEEN IDENTIFIED IN THE PRECIPITATION REGIME. INCLUDED IS A DESCRIPTION OF ACTUAL EVAPOTRANSPIRATION, PLUS AN ESTIMATE OF POTENTIAL EVAPOTRANSPIRATION. THE LONG-TERM CHANGES IN THE WATER BUDGET WHICH MAY RESULT FROM HUMAN ACTIVITIES ARE SUMMARIZED.

OALS/SAHARA/TUNISIA/DESERTIFICATION/HYDROLOGIC BUDGET/ EVAPOTRANSPIRATION/RUNOFF/GROUNDWATER/WATER STORAGE/AGRICULTURAL CLIMATOLOGY

74

FORBES, R.H.

1958

THE EXPANDING SAHARA.

UNIVERSITY OF ARIZONA, PHYSICAL SCIENCE BULLETIN 3. 28 P.

DISCUSSES BRIEFLY BOTH THE NATURAL AND HUMAN CONDITIONS CONTRIBUTING WITHIN RECENT TIME TO THE EXTENSION OF THE SAHARA SOUTHWARD. HUMAN AGENCIES IN ACTIVE OPERATION INCLUDE GRASS FIRES, OVERGRAZING, SLASHING TO BRING LEAFY BROWSE WITHIN REACH OF LIVESTOCK, INDUSTRIAL REQUIREMENTS THAT DENUDE THE LAND, DEMAND FOR DOMESTIC FUEL, AGRICULTURAL DEVELOPMENT THAT CALL FOR EXTENSIVE AND OFTEN UNWISE LAND CLEARING, AND LUMBERING OEPRATIONS. THE AUTHOR CONCLUDES THAT NATURE AND MAN, IN TANDEM, HAVE COOPERATED, WITTINGLY OR OTHERWISE, TOWARD EXTENSION OF THE SAHARA SOUTHWARD THROUGH IGNORANT AND CARELESS PRACTICES, AND POINTS OUT THAT ONLY ADMINISTRATIVE FORCES OF CIVILIZED GOVERNMENTS HAVE THE POWER AND RESPONSIBILITY FOR REMEDIAL MEASURES. THE PAPER IS ILLUSTRATED WITH A NUMBER OF PHOTOGRAPHS THAT DEMONSTRATE HIS POINTS. (OALS)

OALS/SAHARA/DESERTIFICATION/BURNING/GRAZING/PERTURBATION/LAND USE/ SAHELIAN ZONE

75

FRENCH, N.H.

1968

GRASS SEEDING IN THAL, WEST PAKISTAN.

ANNALS OF ARID ZONE 7(2):221-229. SWRA W70-01808.

AVERAGE ANNUAL RAINFALL IN THE THAL AREA OF WEST PAKISTAN RANGES BETWEEN FIVE AND EIGHT INCHES. SUCH LAND IS TOO ARID TO SUPPORT CULTIVATION, YET INVESTIGATIONS SHOWED THAT IT HAD SUPPORTED ADEQUATE GRASS FOR LIVESTOCK PRODUCTION IN THE PAST. SERIOUS OVERGRAZING FOR POSSIBLY A CENTURY HAD CHANGED THE ECOLOGICAL COMPLEX AND ALL BUT ELIMINATED DESIRABLE SPECIES OF GRASS. THE PROBLEM WAS TO FIND SUITABLE SPECIES THAT COULD UTILIZE AVAILABLE SOIL MOISTURE TO SUPPORT LIVESTOCK GRAZING. RESEARCH BY THE CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR, INDIA, HAD INDICATED CERTAIN SUITABLE SPECIES. TRIALS IN THAL DEVELOPED PROPER METHODS FOR SEEDING AND INCREASING FORAGE FROM 200 TO MORE THAN 1500 POUNDS PER ACRE. SUCH AN INCREASE IS APPARENTLY POSSIBLE FOR MILLIONS OF ACRES OF SIMILAR AREA. ESTIMATED COSTS AND RETURNS ARE GIVEN TOGETHER WITH A GUIDE FOR PROPER STOCKING TO MAINTAIN FORAGE PRODUCTION. ECONOMIC FEASIBILITY, HOWEVER, DEPENDS ON USE OF HIGH QUALITY, PRODUCTIVE STOCK. (OALS)

OALS/PAKISTAN, WEST/ARID LANDS/DESERTIFICATION/GRAZING/VEGETATION ESTABLISHMENT/REVEGETATION /LIVESTOCK/FORAGE PRODUCTION/PRODUCTIVITY/ CARRYING CAPACITY/PERTURBATION

76

FRITTS, H.C.

1965

TREE-RING EVIDENCE FOR CLIMATIC CHANGES IN WESTERN NORTH AMERICA.

MONTHLY WEATHER REVIEW 93(7):421-443.

THE RELATIONSHIPS BETWEEN CLIMATIC FACTORS AND FLUCTUATIONS IN DATED TREE-RING WIDTHS ARE STATISTICALLY EVALUATED. A WIDE RING INDICATES THAT THE YEAR S CLIMATE WAS MOIST AND COOL, AND A NARROW RING DRY AND WARM. IN GENERAL, RING WIDTH RELATED TO A 14-MONTH PERIOD FROM JUNE THROUGH JULY BUT MOST TREE-RING CHRONOLOGIES EXHIBIT A CLOSER RELATIONSHIP WITH AUTUMN, WINTER, AND SPRING MOISTURE THAN WITH SUMMER MOISTURE. THE CLIMATIC RELATIONSHIPS FOR EVERGREEN TREES ARE ATTRIBUTED LARGELY TO THE INFLUENCE OF ENVIRONMENTAL FACTORS ON PHOTOSYNTHESIS AND THE ACCUMULATION OF FOOD RESERVES. UNDER ABNORMALLY DRY AND WARM CONDITIONS, ESPECIALLY DURING THE AUTUMN, WINTER, AND SPRING, LITTLE FOOD IS ACCUMULATED, NEW CELLS ARE FORMED MORE SLOWLY DURING THE GROWING PERIOD, AND THE RESULTING RING IS NARROW. RELATIVE 10-YEAR DEPARTURES ARE CALCULATED FOR THE ENTIRE LENGTH OF 26 TREE-RING CHRONOLOGIES FROM WESTERN NORTH AMERICA. THOSE PORTIONS AFTER 1500 ARE USED TO MAP AREAS OF HIGH AND LOW MOISTURE. PERIODS OF WIDESPREAD DROUGHT ARE NOTED IN 1576-1590, 1626-1635, 1776-1785, 1841-1850, 1871-1880, 1931-1970. PERIODS OF WIDESPREAD AND ABOVE AVERAGE MOISTURE OCCURRED DURING 1611-1625, 1641-16250, 1741-1755, 1626-1840, 1906-1920. THE MOIST PERIODS OF 1911-1925, AND 1906-1920 WERE MOST WIDESPREAD AND MARKEDLY ABOVE AVERAGE. (AUTHOR)

OALS/SOUTHWEST U.S./DENDROCHRONOLOGY /CLIMATOLOGY/DROUGHTS/WEST U.S. /ANALYTICAL TECHNIQUES/CLIMATIC CHANGE

77

FRITTS, H.C. ET AL.

1971

MULTIVARIATE TECHNIQUES FOR SPECIFYING TREE-GROWTH AND CLIMATE RELATIONSHIPS AND FOR RECONSTRUCTING ANOMALIES IN PALEOCLIMATE.

JOURNAL OF APPLIED METEOROLOGY 10(5):845-864.SWRA W72-07055.

FEW LONG-TERM CLIMATIC RECORDS ARE AVAILABLE FOR WESTERN NORTH AMERICA BECAUSE OF LOW POPULATION DENSITIES AND RECENT SETTLEMENT. ALTHOUGH TREE RINGS CAN BE PRECISELY DATED AND THEIR WIDTHS CAN BE USED TO EXTEND THE CLIMATIC RECORD BACKWARDS IN TIME, THE USEFULNESS OF THIS METHOD HAS BEEN LIMITED. TREE-RING DATA REPRESENT A GREAT VARIETY OF RESPONSES TO THE ENVIRONMENT WHICH GENERATES AN AWKWARD NUMBER OF VARIABLES FOR DATA PROCESSING. UNTIL RECENTLY, IT WAS NECESSARY TO SELECT HIGHLY STRATIFIED SAMPLES WHOSE GROWTH HAS BEEN SIMILARLY LIMITED BY A SMALL NUMBER OF ENVIRONMENTAL VARIABLES. ADVANCES IN COMPUTER PROCESSING TECHNIQUES AND MULTIVARIATE STATISTICAL ANALYSIS HAVE ALLEVIATED SOME OF THE DATA GATHERING RESTRICTIONS. ENVIRONMENTAL VARIABLES ARE DIAGRAMMED AND RESPONSE FUNCTIONS DERIVED WHICH RELATE RING-WIDTH CHRONOLOGIES TO SEASONAL CLIMATIC CHRONOLOGIES. A LARGE NUMBER OF CLIMATIC VARIABLES WERE

CALIBRATED USING MULTIVARIATE ANALYSES. A SERIES OF TRANSFER FUNCTIONS ALLOWED ESTIMATES OF ANOMALOUS CLIMATIC VARIATIONS FROM THE TREE-RING RECORDS AND FOR PERIODS WITHOUT WHICH CLIMATIC RECORDS ARE AVAILABLE. RECONSTRUCTION OF THE ANOMALOUS VARIATIONS WERE OBTAINED BACK TO 1700 A.D. THE RESULTS INDICATE THAT MULTIVARIATE ANALYSIS COULD WELL REVOLUTIONIZE DENDROCHRONOLOGY BY LIBERATING IT FROM THE RESTRICTIONS OF ARID FOREST BORDERS AND ARCTIC TREELINES.

OALS/PRECIPITATION(ATMOSPHERIC)/ANALYTICAL TECHNIQUES/ DENDROCHRONOLOGY/CLIMATIC DATA/HISTORY/PLANT GROWTH/ENVIRONMENTAL EFFECTS/NORTH AMERICA/TIME MEASUREMENT /PALEOCLIMATOLOGY

78

GABRIEL, K.R.

1967

ISRAELI ARTIFICIAL RAINFALL STIMULATION EXPERIMENT: STATISTICAL EVALUATION FOR THE PERIOD 1961-1965.

SYMPOSIUM ON MATHEMATICAL STATISTICS AND PROBABILITY, 5TH, BERKELEY, CALIFORNIA, 1965-1966, PROCEEDINGS 5:91-113. MGA 19.6-190. SWRA W70-01821.

A RAINFALL STIMULATION EXPERIMENT IS BEING CARRIED OUT IN ISRAEL BY SEEDING SILVER IODIDE FROM AN AIRCRAFT IN A RANDOMIZED CROSS-OVER DESIGN. RESULTS OF 4 1/2 SEASONS SHOW 15 PERCENT MORE RAINFALL WITH SEEDING THAN WITH OUT, A RESULT WHICH IS 5 PERCENT SIGNIFICANT. IT IS SUSPECTED THAT THE EXCESS PRECIPITATION HAS OCCURRED MAINLY ON A SMALL NUMBER OF DAYS ON WHICH SEEDING APPARENTLY WAS VERY EFFECTIVE. IT HAS NOT BEEN POSSIBLE TO IDENTIFY METEOROLOGICAL CONDITIONS PARTICULARLY FAVORABLE TO SEEDING EFFECTIVENESS. NO EVIDENCE HAS BEEN FOUND THAT SEEDING EFFECTS PERSIST BEYOND THE DAY OF SEEDING.

ISRAEL/WEATHER MODIFICATION/ARTIFICIAL PRECIPITATION/CLOUD SEEDING/ RAINFALL/OALS

79

GALMARINI, A.G./RAFFO DEL CAMPO, J.M./AMIGO, A.

1968

INVESTIGATION OF POSSIBLE CHANGES IN THE CLIMATE OF PATAGONIA; OVER-GRAZING IN THE PATAGONIA REGION: ITS CAUSES AND PROPOSED SOLUTIONS. IN INTERNATIONAL CONFERENCE ON WATER FOR PEACE, WASHINGTON, D.C., MAY 23-31, 1967.

WATER FOR PEACE, 2:721-728. MGA 21.8-522.

THERE IS REASON TO BELIEVE THERE HAS BEEN A GRADUAL CHANGE IN THE REGION S CLIMATE, AND THAT THE REDUCTION IN THE PRODUCTIVITY OF PASTURES IS DUE TO A DECREASE IN PRECIPITATION AND CHANGES IN ITS TEMPORAL DISTRIBUTION AND TO AN INCREASE IN TEMPERATURE AND EVAPORATION. A STATISTICAL ANALYSIS OF THE RECORDS FROM 25 PLUVIOMETRIC STATIONS SHOWED AN UPWARD LONG-TERM TREND FOR MOST OF THE STATIONS AND A DOWNWARD TREND FOR ONLY A FEW STATIONS GROUPED IN LIMITED AREAS. MARKED DIFFERENCES WERE FOUND IN THE SHORT TERM TRENDS OF PRECIPITATION. IT WAS CONCLUDED THAT DECREASE IN PASTURE LAND.

INCREASED EROSION, AND OTHER RELATED PHENOMENA CANNOT BE ATTRIBUTED TO CLIMATIC CAUSES. AN ANALYSIS OF OVERGRAZING AND OF ITS CAUSES LEADS TO THE RECOMMENDATION THAT THE NUMBER OF SHEEP BE REDUCED BY 30 TO 49 PERCENT.

OALS/PATAGONIAN DESERT/ARGENTINA/CLIMATIC CHANGE/GRAZING/CLIMATIC DATA/EROSION/LIVESTOCK/REGIONAL ANALYSIS/CLIMATIC-VEGETAL RELATIONSHIPS

80

GANSSEN, R.

1960

BOEDEN UND LANDSCHAFT IN SUEDWESTAFRIKA (SOIL AND LANDSCAPE IN SOUTH WEST AFRICA).

INTERNATIONAL CONGRESS OF SOIL SCIENCE, 7TH, MADISON, TRANSACTIONS 4:49-55.

DESERT SOILS ARE IDENTIFIED IN WEST AND SOUTH, SEMIDESERT SOILS IN SOUTH AND MIDDLE, AND DRY FOREST SOILS IN NORTH. DEPRESSIONS HAVE CLAY SOILS HIGH IN ORGANIC MATTER IN THE NORTH AND HIGH IN SALTS IN THE SOUTH, WITH SOME TAKYR-LIKE SOILS IN THE SOUTH. THE SOIL CATENARY SEQUENCE IS SIMILAR IN HIGHLAND-VALLEY AREAS THROUGHOUT SOUTH WEST AFRICA. THERE IS MUCH WIND AND WATER EROSION. OVERGRAZING HAS DENUDED THE LANDSCAPE.

OALS/SOUTH WEST AFRICA/SOIL TYPES/PERTURBATION/WIND EROSION/EROSION/ TAKYRS/CLAYS/SALINE SOILS/GRAZING

81

GARDNER, J.L.

1950

EFFECTS OF THIRTY YEARS OF PROTECTION FROM GRAZING IN DESERT GRASSLAND.

ECOLOGY 31(1):44-50. BA(24)22597.

MEASUREMENTS AND OBSERVATIONS OF VEGETATION IN A 320-ACRE TRACT OF DESERT GRASSLAND, PROTECTED FROM DOMESTIC ANIMALS SINCE 1918, SITUATED NEAR SILVER CITY, NEW MEXICO, AT AN ELEVATION OF 5600 FEET, WERE MADE IN 1946 AND 1948. IN 1946, GRASS DENSITY ON PROTECTED UPLAND SITES AVERAGED 9.64 PERCENT; THAT ON COMPARABLE SITES IMMEDIATELY OUTSIDE THE TRACT 4.58 PERCENT. IN 1948, AFTER 2 YEARS OF SEVERE DROUGHT, GRASS DENSITY ON THE SAME SITES AVERAGED 2.34 PERCENT INSIDE AND 1.02 PERCENT OUTSIDE. PART OF A LOWLAND TOBOSA GRASS FLAT HAD BEEN PLOWED AND CROPPED FROM 1914 TO 1918, BUT UNDISTURBED SINCE. IN 1948, THE PLOWED AREA SUPPORTED AN AVERAGE GRASS DENSITY OF 1.33 PERCENT; THE ADJACENT UNPLOWED AREA, 2.34 PERCENT. ON THE FORMER AREA, VERY LITTLE TOBOSA GRASS WAS OBSERVED; ON THE LATTER, IT WAS THE ONLY DOMINANT

GRASS. THE DIVIDING LINE BETWEEN PLOWED AND UNPLOWED WAS STILL SHARP. UNDER PROTECTION, ARROYOS WERE HEALING; OUTSIDE THEY WERE RAW AND ERODING.

OALS/WGM/SWERVE/DESERT GRASSLAND/GRASSLAND BIOME/UNGRAZED/NEW MEXICO/ EROSION CONTROL/ARROYOS/PLANT COVER/DROUGHTS/ENVIRONMENTAL EFFECTS/ VEGETATION CHANGE/HILARIA MUTICA/PERTURBATION

82

GARDNER, J.L./MYERS, L.E. EDS.

1967

WATER SUPPLIES FOR ARID REGIONS.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION, COMMITTEE ON DESERT AND ARID ZONES RESEARCH, CONTRIBUTION 10. 62 P. SWRA W70-06677.

WATER SUPPLY PROBLEMS IN ARID REGIONS CANNOT BE SOLVED UNLESS ALL ASPECTS OF THE PROBLEMS ARE GIVEN PROPER CONSIDERATION. OBTAINING ADDITIONAL WATER BY IMPORTATION, DESALINATION, CLOUD SEEDING, OR INCREASING PRECIPITATION RUNOFF FROM WATERSHEDS IS NECESSARY BUT NOT SUFFICIENT. ATTENTION MUST ALSO BE PAID TO WATER POLLUTION, ALTERNATIVE WATER USES, REUSE OF WATER, AND THE ACCUMULATION OF SALT IN GROUNDWATER AND SOILS. THESE PROBLEMS ARE PARTICULARLY ACUTE IN ARID REGIONS WHERE WATER SUPPLIES ARE LIMITED AND HARMFUL SALTS AND WASTES ARE NOT REMOVED BY AN OUTFLOW OF WATER FROM THE REGIONS. SOME OF THESE PROBLEMS ARE DISCUSSED IN THE FOLLOWING PAPERS OF THIS SYMPOSIUM.

OALS/ARID LANDS/WATER SUPPLY/WATER TRANSFER /DESALINATION/CLOUD SEEDING/RUNOFF/WATER CONSERVATION/WATER REUSE/WATER YIELD IMPROVEMENT/ SALINE WATER/ENVIRONMENTAL ENGINEERING

83

GAUTIER-PILTERS, H.

1965

OBSERVATIONS SUR L ECOLOGIE DU DROMADAIRE DANS L OUEST DU SAHARA (OBSERVATIONS ON THE ECOLOGY OF THE DROMEDARY IN THE WESTERN SAHARA).

INSTITUT FRANSCAIS D AFRIQUE NOIRE, BULLETIN 27-A(4):1534-1608. GA 68B-118.

A DESCRIPTION OF THE PHYSICAL ENVIRONMENT OF WESTERN ALGERIA, FOLLOWED BY ACCOUNTS OF THE GRAZING LANDS OF THE DROMEDARIES, THE DISTRIBUTION OF VEGETATION IN THE AREAS VISITED, THE WATER RETAINING PROPERTIES OF THE PLANTS AND THE QUANTITY OF PLANTS INGESTED. AN ASSESSMENT IS THEN ATTEMPTED OF THE PRODUCTIVITY OF CERTAIN TYPES OF PASTURE, AS WELL AS A DISCUSSION OF THE FREQUENCY WITH WHICH THE ANIMALS DRINK, AVAILABILITY OF WATER, AND AMOUNT OF WATER CONSUMED FROM WATER-HOLES AND PLANTS. THE VALUE OF CERTAIN PASTURES IN CERTAIN AREAS IS CONSIDERED. AN APPEAL IS MADE FOR THE PRESERVATION OF THE

NOMADIC LIFE. PERMANENT SETTLEMENT IS NOT THE MEANS BY WHICH TO AMELIORATE THE WAY OF LIFE OF THE NOMADS, BUT BY THE ESTABLISHMENT AND MULTIPLICATION OF WELLS TO PERMIT A WIDER USE OF AVAILABLE PASTURES.

OALS/CAMELS/SAHARA/ALGERIA/GRAZING/PASTURES/FOOD HABITS/WATER HOLES/ WATER SUPPLY/NOMADS/SOCIAL ASPECTS/ANIMAL BEHAVIOR/ANIMAL ECOLOGY

84

GAVRILOVIC, D.

1970

DIE UEBERSCHWEMMUNGEN IM WADI BARDAGUE IM JAHR 1968, TIBESTI, REPUBLIQUE DU TCHAD (THE FLOODS IN THE WADI BARDAGUE IN 1968).

ZEITSCHRIFT FUER GEOMORPHOLOGIE 14(2):202-218. SWRA W72-00895.

RAINFALL IN THE CENTRAL SAHARA IS GOVERNED BY THE INTER-TROPIC CONVERGENCE ZONE, WITH SUMMER MONSOONS CARRYING MOIST AIR NORTHWARD. THE TIBESTI MOUNTAINS ARE THE BORDER BETWEEN MONSOON PRECIPITATION AND MEDITERRANEAN RAINFALL. THE TWO FLOODS DESCRIBED IN THIS PAPER CAN BE CHARACTERIZED BY EROSIONAL PATTERNS THAT SUGGEST WETTER PERIODS IN THE PAST, WHEN A GREATER AMOUNT OF ALLUVIAL MATERIAL WAS CARRIED DOWNSTREAM AND EVENTUALLY FOLLOWED BY A DOWNCUTTING OF THE RIVER BED. THE VELOCITY OF THESE CONTEMPORARY FLOODS CARRIED MATERIAL ERODED IN THE UPPER COURSE OF THE RIVER DOWNSTREAM FOR DEPOSITION IN THE LOWER COURSE, WITH IMPEDIMENTS UNABLE TO PREVENT SCOUR. (OALS)

OALS/WADIS/CHAD/TIBESTI MOUNTAINS/FLOODS/SAHARA/GEOMORPHOLOGY/RUNOFF/ CLIMATIC CHANGE/EROSION/DEPOSITION(SEDIMENTS)/GRAVELS

85

GENTILLI, J.

1971

CLIMATIC FLUCTUATIONS. IN J. GENTILLI, ED., CLIMATES OF AUSTRALIA AND NEW ZEALAND P. 189-211.

ELSEVIER, AMSTERDAM. WORLD SURVEY OF CLIMATOLOGY, V. 13. MGA 22.11-464.

THE CONTENTS OF THIS PAPER ON CLIMATIC FLUCTUATIONS IN AUSTRALIA COMPRISE A HISTORICAL REVIEW OF STUDIES ON WEATHER CYCLES AND THE 19 YEAR LUNAR CYCLE; SOLAR CYCLES; THE SOUTHERN OSCILLATION; CLIMATE TRENDS AND FLUCUATION; THE CLIMATE OF THE SOUTHEAST QUARTER AND THE GENERAL PATTERN OF CLIMATIC CHANGE IN AUSTRALIA. EXTENSIVE DATA ARE PRESENTED IN TABLES, GRAPHS, AND MAPS.

OALS/CLIMATIC CHANGE/AUSTRALIA/CLIMATIC DATA/HISTORY/MAPS/WEATHER PATTERNS

86

GROVE, A.T.

1968

MORPHOLOGY OF ARID ZONE BASINS.

INTERNATIONAL GEOGRAPHICAL CONGRESS, 21ST, INDIA, 1968, ABSTRACTS OF PAPERS, P. 328-329.

BASINS IN THE ARID ZONE, ALONG THE SOUTH SIDE OF THE SAHARA IN THE INTERIOR OF SOUTHERN AFRICA AND IN SOUTH-CENTRAL AUSTRALIA PRESENT ASSEMBLAGES OF LANDFORMS THAT HAVE MUCH IN COMMON. AT THE MARGINS OF THE BASINS, RUGGED UPLANDS BORDERED BY DISSECTED PLATEUS CAPPED WITH DURICRUST PRESENT POSSIBILITIES FOR TRACING EROSIONAL HISTORY. IN THE CENTRAL PARTS OF THE BASINS, TERTIARY AND QUATERNARY SEDIMENTS, PLUS CALCRETES AND SILCRETES, PROVIDE COMPLEMENTARY INFORMATION. THE LATER QUATERNARY HISTORY OF THE BASINS, IS RECORDED IN THE DUNES AND LAKE DEPOSITS AND STRANDLINES OF THE BASIN FLOORS. ARID CONDITIONS, MORE INTENSE AND EXTENSIVE THAN THOSE OF THE PRESENT DAY, AFFECTED THE SENEGAL, INLAND NIGER AND CHAD BASINS, THE KALAHARI AND LAKE EYRE REGION. THEY ARE REPRESENTED BY DUNEFIELDS, CONSISTING MAINLY OF MASSIVE LONGITUDINAL DUNES AT THE SOUTHERN MARGINS OF THE SAHARA AND IN THE NORTHERN KALAHARI, AND BY SAND RIDGES IN THE LAKE EYRE REGION AND SOUTHERN KALAHARI. CONDITIONS HAVE AMELIORATED AND THE DUNES ARE LARGELY COVERED BY VEGETATION. IN THE SAHARAN BASINS, LAKE DEPOSITS AND STRANDLINES SHOW THAT THE CLIMATE WAS MUCH WETTER THAN NOW ABOUT THE COMMENCEMENT OF THE HOLOCENE. NEW INFORMATION IS PRESENTED FROM THE KALAHARI, ABOUT A LARGE LAKE THAT OCCUPIED THE MAKARIKARI DEPRESSION, POSSIBLY ABOUT THIS TIME. THE EXTENSVE SYSTEMS OF FIXED DUNES IN THE KALAHARI ARE COMPARED WITH THOSE ALONG THE SOUTH SIDE OF THE SAHARA AND IN AUSTRALIA.

OALS/LANDFORMS/GEOMORPHOLOGY/BASINS/SAHARA/KALAHARI-NAMIB/LAKE EYRE/ CLIMATIC CHANGE/DUNES/QUATERNARY PERIOD/GEOGRAPHICAL ORIGIN

87

GROVE, A.T.

1970

RISE AND FALL OF LAKE CHAD.

GEOGRAPHICAL MAGAZINE 42(6):433-439. GA 71A-1720.

AERIAL PHOTOGRAPHS ARE BEING USED IN FIELD STUDIES OF THE LAKE AND THE SURROUNDING PLAIN WHERE SHRINKING SHORELINES INDICATE CLIMATIC FLUCTUATIONS HAVE OCCURRED DURING THE PAST FEW HUNDRED THOUSAND YEARS. RESEARCH IS IN PROGRESS TO ESTABLISH PREVIOUS CLIMATE PATTERNS FROM FORMER LAKE LEVELS. POLDERS HAVE BEEN CREATED NEAR BOL AND IRRIGATED WATER GARDENS HAVE BEEN ESTABLISHED. NEARLY ALL THE INCOMING WATER IS LOST BY EVAPORATION, BUT THE LAKE WATER REMAINS FRESH. PROBLEMS ARE ARISING WITH INCREASING SALINITY OF THE SOILS.

OALS/AERIAL PHOTOGRAPHY /CLIMATIC CHANGE/LAND RECLAMATION/IRRIGATION/ SALINE SOILS/LAKE CHAD/LAKES/CHAD

88

GROVE, A.T.

1971

DESERTIFICATION IN THE AFRICAN ENVIRONMENT.

BACKGROUND PAPER PRESENTED AT THE U.N. SEMINAR ON THE HUMAN ENVIRONMENT, ADDIS ABABA, AUGUST 1971. (UNPUBLISHED).

THE MOST PERCEPTIVE AND COMPREHENSIVE OVERVIEW TO DATE OF THE FACTORS AND THEORIES RELATING TO DESERTIFICATION IN THE SAHARA, THE KALAHARI AND OTHER DESERT AND SEMI-DESERT REGIONS. RECENT STUDIES PROVIDE IMPORTANT INFORMATION NOT AVAILABLE TO THOSE ASSESSING DESERT ENCROACHMENT 30 YEARS AGO. CLIMATIC CHANGES ARE DISCUSSED ON TWO SCALES, A) MAJOR CHANGES OF CLIMATE IN THE LAST 20,000 YEARS, AND B) MINOR CHANGES OF CLIMATE IN THE LAST FEW HUNDRED YEARS. LAKE LEVELS, FLOODING OF THE NILE, AND RAINFALL VARIATIONS ARE SURVEYED. IN RECENT TIMES NO LONG CONTINUED TRENDS OR OBVIOUS CYCLIC PERIODICITY OCCURRED. YEARS OF HIGH OR LOW RAINFALL TEND TO BE BUNCHED TOGETHER, 2 OR 3 YEARS, IN LONGER PERIOD OF 10 OR 15 YEARS. THESE PERIODS OCCUR CONTINENT-WIDE AT THE SAME TIME. MAN S ROLE IN DESERT ENCROACHMENT IS REVIEWED. OVERGRAZING HAS BECOME MORE SERIOUS RECENTLY BECAUSE OF INCREASES IN NUMBERS OF LIVESTOCK, LACK OF MOVEMENT OF FLOCKS BY SMALL SEDENTARY CULTIVATORS AND THOSE GRAZING AROUND RECENTLY ESTABLISHED WELLS. WOODCUTTING FOR FUEL AROUND POPULATED AREAS IS A SERIOUS PROBLEM. OLD ESTIMATES OF THE RATE OF DESERT ENCROACHMENT ARE COMPARED WITH NEW PHTOGRAPHIC TECHNIQUES. IN GENERAL THE AUTHOR THINKS THAT GREAT SCHEMES FOR CLIMATIC AMELIORATION, SUCH AS DIVERSION OF GREAT RIVERS, ARE UNWORKABLE. HE ALSO FEELS THAT THE CREATION OF STRIPS OF FOREST ACROSS AFRICA AS A BARRIER AGAINST ENCROACHMENT OF THE SAHARA WOULD BE POOR USE OF THE LIMITED RESOURCES AVAILABLE. SMALLER SCALE REMEDIES ARE ADVOCATED. IT IS SUGGESTED THAT PASTORAL NOMADISM IS AN EFFICIENT UTILIZATION OF THE LAND AND SHOULD NOT BE ELIMINATED WITHOUT CAREFUL CONSIDERATION.

OALS/AFRICA/KALAHARI-NAMIB/SAHARA/EAST AFRICA/SOUTH WEST AFRICA/WEST AFRICA/SUDAN/CHAD/NILE RIVER/LAKE BASINS/DESICCATION/DESERTIFICATION/ DESERTS/GRAZING/PERTURBATION/VEGETATION CHANGE/CLIMATIC CHANGE/ DROUGHTS /SEMIARID CLIMATES/PALEOCLIMATOLOGY/REFORESTATION/NOMADS/ DEGENERATION/SAHELIAN ZONE

89

GUPTA, R.K.

1968

ANTHROPOGENIC INFLUENCES ON THE VEGETATION OF WESTERN RAJASTHAN.

VEGETATIO 16(1-4):79-94. BA(50)96177. GA 698-553. GA(41)1333.

THE EXTENT TO WHICH THE PRESENT DESERTIC ASPECTS OF THIS AREA IS DUE TO MAN S ACTIVITIES IS DISCUSSED, INCLUDING OVERGRAZING OF NATURAL PASTURES, CHANGES IN VEGETATION, INTRODUCTION AND SPREAD OF UNDESIRABLE PLANTS, AND DEGRADATION OF THE MICROCLIMATE FOLLOWING ON SUCH PERTURBATIONS. THE AUTHOR ARGUES THAT GIVEN PROTECTION OR CONSERVATION, EVERGREEN FOREST OR BUSH COULD BECOME ESTABLISHED,

BUT THAT BY PRESENT MISMANAGEMENT, THE ARIDITY OF THE AREA IS REINFORCED AND THUS PERPETUATED. HE POINTS OUT THAT NOT ALL INTRODUCED PLANTS ARE UNDESIRABLE, AND THAT PROSOPIS JULIFLORA, FOR INSTANCE, HAS DONE WELL. SUCCESSIONS ON VARIOUS SOILS AND IN VARIOUS HABITATS ARE SHOWN BY FIGURES, AND THE SUBSEQUENT ESTABLISHMENT OF PLANT COMMUNITIES.

OALS/RAJASTHAN/DESERTIFICATION/GRAZING/INTRODUCED SPECIES/PROSOPIS JULIFLORA/PLANT COMMUNITIES/SUCCESSION/PERTURBATION/VEGETATION/INDIA

90

HALWAGY, R.

1962

THE IMPACT OF MAN ON SEMI-DESERT VEGETATION IN THE SUDAN.

JOURNAL OF ECOLOGY 50:263-273.

THE SALIENT FEATURES OF DESERT SCRUB OF NORTHERN SUDAN AND A NOTE ON THE LIVESTOCK POPULATION AND GRAZING HABITS ARE GIVEN. QUANTITATIVE ESTIMATES WERE MADE OF THE VEGETATION INSIDE AND OUTSIDE A FENCED ENCLOSURE. THE EFFECT OF INTERFERENCE NEAR VILLAGES IS COMPARED WITH THAT AWAY FROM THEM. THE STUDY SHOWS THAT SHRUBS OUTSIDE THE ENCLOSURE ARE INTENSIVELY BROWSED, THOSE NEAR THE VILLAGES MORE SEVERELY SO, WHILE SHRUBS AWAY FROM VILLAGES ARE SUBJECT TO FELLING AS WELL. THE PERENNIAL GRASS IS ALSO GRAZED OUTSIDE THE ENCLOSURE SO THAT ITS HEIGHT IS GREATLY REDUCED. ANNUAL GRASSES RECEIVE THE HEAVIEST BRUNT OF THE ATTACK, BEING COMPLETELY WIPED OUT NEAR VILLAGES, WHILE SCATTERED, BEATEN-DOWN REMNANTS OCCUR AWAY FROM VILLAGES. THE ROLE PLAYED BY THIS WANTON DESTRUCTION OF VEGETATION BY MAN AND BEAST IN CREATING DESERT CONDITIONS HERE AND ELSEWHERE IS DISCUSSED. PROTECTIVE MEASURES TO PROMOTE THE NATURAL VEGETATION, CHECK SOIL EROSION, AND REDUCE THE MENACE OF THE VIOLENT SAND- AND DUST-STORMS WHICH ARE NOW COMMON AT THE CLOSE OF THE DRY SEASON, ARE DISCUSSED.

OALS/SUDAN/AFRICA/SAHARA/VEGETATION CHANGE/GRAZING/LIVESTOCK/ ENVIRONMENTAL EFFECTS/EXCLOSURES/PERTURBATION/DESERTIFICATION/ DESICCATION/GRASSES/SHRUBS/SOIL EROSION/LAND MANAGEMENT

91

HANSEN, H.P.

1947

POST GLACIAL VEGETATION OF THE NORTHERN GREAT BASIN.

AMERICAN JOURNAL OF BOTANY 34(3):164-171.

THIS STUDY IS CONCERNED WITH THE POLLEN ANALYSIS OF THREE SEDIMENTARY COLUMNS IN THE NORTHERN GREAT BASIN OF SOUTH CENTRAL OREGON, AND THE INTERPRETATION OF THE POLLEN PROFILES IN TERMS OF FOREST SUCCESSION AND CLIMATIC TRENDS. THE DATA IN THIS STUDY PROVIDE STRONG SUPPORT FOR THE OCCURRENCE OF THE XEROTHERMIC STAGE BETWEEN 8,000 AND 4,000

YEARS AGO. AT THAT TIME FORESTS WERE MAXIMALLY CONTRACTED; SINCE THEN THEY HAVE SLIGHTLY EXPANDED BUT HAVE NEVER REGAINED THEIR EARLY POST-GLACIAL ABUNDANCE.

OALS/PALEOCLIMATOLOGY/PALYNOLOGY/GREAT BASIN/ARID LANDS/OREGON/ FORESTS/VEGETATION/SHRUBS /GRASSES/PINUS CONTORTA/PINUS MONTICOLA/ PINUS PONDEROSA/CLIMATIC-VEGETAL RELATIONSHIPS/NORTHERN DESERT SHRUB / CLIMATIC CHANGE/DESERTIFICATION/ARTEMISIA/SARCOBATUS/ATRIPLEX

92

HARE, F.K.

1961

THE CAUSATION OF THE ARID ZONE.

UNESCO, PARIS. ARID ZONE RESEARCH 17:25-30.

THE ARIDITY OF THE SUBTROPICS EMERGES AS AN ASPECT OF WORLD CLIMATE DEPENDENT ON DEEP-SEATED FEATURES OF THE EARTH S GENERAL ATMOSPHERIC CIRCULATION. IT DOES NOT ARISE FROM LOCAL OR MAN-MADE CIRCUMSTANCES, BUT FROM NATURAL CAUSES INVOLVING EXCEEDINGLY LARGE ENERGY TRANSFORMATIONS AND MOMENTUM TRANSPORTS. IT IS INCONCEIVABLE THAT THE REGIME CAN BE SIGNIFICANTLY ALTERED BY HUMAN INTERVENTION. IT IS EQUALLY UNLIKELY THAT ANY PAST CLIMATIC EPOCH CAN HAVE EXPERIENCED A COMPLETE ABSENCE OF SUBTROPICAL ARIDITY. THE MAINTENANCE OF THE MID-LATITUDE WESTERLIES ABSOLUTELY REQUIRES THE EXISTENCE OF COMPENSATING EASTERLIES IN THE TROPICS. SIMILARLY THE TRANSFER OF MOMENTUM AND HEAT NORTHWARD IN THE TROPICS REQUIRES THE EXISTENCE OF A HADLEY CELL, WELL SUBSIDENCE (AND HENCE LOW HUMIDITY AND DROUGHT) AT SOME SUBTROPICAL LATITUDE. HENCE IT SEEMS LIKELY THAT THE ARID ZONE CAN HAVE BEEN NO MORE THAN CONSTRICTED IN EXTENT AND DRIVEN A FEW DEGREES EQUATORWARD AT THE HEIGHT OF THE RECENT GLACIATION; IT CAN HARDLY HAVE BEEN ELIMINATED ALTOGETHER. (AUTHOR)

OALS/ARID CLIMATE/CLIMATIC ZONES/METEOROLOGY/AIR MASSES/DISTRIBUTION/ GENERAL CIRCULATION/ATMOSPHERIC CIRCULATION/WIND(METEOROLOGY)/SYNOPTIC CLIMATOLOGY/ARIDITY

93

HARRIS, D.R.

1966

RECENT PLANT INVASIONS IN THE ARID AND SEMI-ARID SOUTHWEST OF THE UNITED STATES.

ASSOCIATION OF AMERICAN GEOGRAPHERS, ANNALS 56(3):408-422. GA 688-596.

SEVERAL PLANT COMMUNITIES IN THE SOUTHWEST HAVE BEEN DRASTICALLY ALTERED WITHIN A CENTURY BY THE RAPID SPREAD OF A SMALL NUMBER OF WOODY SPECIES. THE HABITATS PRINCIPALLY AFFECTED HAVE BEEN THE PLATEAUS AND PLAINS AT INTERMEDIATE ELEVATIONS, THAT FORMERLY SUPPORTED GRASSLAND AND HAVE NOW BEEN INVADED ON A MASSIVE SCALE BY MESQUITE AND OTHER NATIVE SHRUBS; AND THE STREAM COURSES, THAT HAVE BEEN EXTENSIVELY OCCUPIED BY TAMARISK, AN ALIEN SPECIES FROM EURASIA. HISTORICAL EVIDENCE AND FIELD OBSERVATIONS SUGGEST THAT THESE

INVASIONS HAVE RESULTED PRIMARILY FROM OCCUPATION OF THE SOUTHWEST BY AMERICAN SETTLERS. THE DEVELOPMENT OF COMMERCIAL LIVESTOCK RANCHING LED TO INCREASED SEED DISPERSAL, OVERGRAZING, AND THE SUPPRESSION OF GRASS FIRES, THE COMBINED EFFECTS OF WHICH FAVOURED THE INVASION OF GRASSLAND BY WOODY PLANTS. SHORT-TERM CLIMATIC FLUCTUATIONS TOWARDS GREATER ARIDITY HAVE TENDED TO ACCENTUATE RATHER THAN TO INITIATE THE PROCESSES OF INVASION. (AUTHOR)

OALS/WGM/SOUTHWEST U.S./SEMIARID CLIMATE/SUCCESSION/PROSOPIS/SHRUBS/ PLANT INVADERS/LAND USE/DESERT GRASSLAND/TAMARIX/GRAZING/PLAINS/ PLATEAUS/WOODY PLANTS

94

HARSHBARGER, J.W.

1968

GROUND-WATER DEVELOPMENT IN DESERT AREAS.

GROUND WATER 6(5):2-4. SWRA W69-00366.

A SUMMARY OF GROUNDWATER DEVELOPMENT IN SEVERAL MAJOR WORLD DESERTS, 1958-1968, INCLUDING THE SAHARA, EGYPTIAN, ATACAMA, PERUVIAN, AND NORTH AMERICAN DESERTS. SOME BASIC PRINCIPLES FOR OPTIMUM GROUNDWATER MANAGEMENT ARE CITED, WITH THE INDUS BASIN OF WEST PAKISTAN GIVEN AS AN EXAMPLE OF MODEL SOPHISTICATED WATER MANAGEMENT. IT IS CONCLUDED THAT WHILE PHYSICAL RESOURCES AND KNOWLEDGE ARE AVAILABLE TO DEVELOP DESERT AREAS, AND THE COMPUTER AND WATER SYSTEMS ANALYSIS CAN BE USED IN WATER MANAGEMENT, MAN HIMSELF MUST SUPPLY THE WISDOM AND JUDGMENT TO EXPLOIT THESE TOOLS INTELLIGENTLY.

WATER MANAGEMENT/OALS/WATER RESOURCES DEVELOPMENT/HYDROGEOLOGY / GROUNDWATER/SAHARA/ATACAMA/PERUVIAN DESERT /INDUS BASIN/PAKISTAN, WEST /EGYPT/DESERTS/WEST U.S.

95

HASTINGS, J.R.

1959

VEGETATION CHANGE AND ARROYO CUTTING IN SOUTHEASTERN ARIZONA.

ARIZONA ACADEMY OF SCIENCE, JOURNAL 1:60-67.

HISTORICAL RECORDS REVEAL THAT IN 1892, WITH 50,000 CATTLE, 7.08 INCHES OF SUMMER RAINFALL PRODUCED NO UNUSUAL FLOOD CONDITIONS, WHEREAS IN 1886, WITH 156,000 CATTLE, 4.63 INCHES DID CAUSE FLOODING, AS DID 253,000 CATTLE IN 1890 WITH 7.92 INCHES. THE IDEA THAT OVERGRAZING PLAYED AN IMPORTANT PART IN CHANGING THE FACE OF SOUTHEASTERN ARIZONA IS HARDLY OPEN TO QUESTION. NEVERTHELESS THERE IS A DISTINCT POSSIBILITY THAT SECULAR TRENDS IN CLIMATE WERE OPERATING IN SUCH A WAY AS TO CONTRIBUTE TO THE OTHER FACTORS THAT CREATED THE VEGETATION CHANGE AND ARROYO CUTTING UNDER OBSERVATION.

WEATHER RECORDS ARE BEING COMPILED AT THE UNIVERSITY OF ARIZONA INSTITUTE OF ATMOSPHERIC PHYSICS THAT MAY GIVE SUPPORT TO THIS LATTER THEORY.

OALS/WGM/NPS-ONS/SWERVE/GRAZING/ARIZONA/DESERT GRASSLAND/GRASSLAND BIOME/CLIMATIC-VEGETAL RELATIONSHIPS/CLIMATIC CHANGE/GULLY EROSION/ SOIL EROSION/HISTORY/VEGETATION CHANGE/RANGE MANAGEMENT/CARRYING CAPACITY/CLIMATIC DATA

96

HASTINGS, J.R.

1963

HISTORICAL CHANGES IN THE VEGETATION OF A DESERT REGION.

UNIVERSITY OF ARIZONA (PH.D. DISSERTATION). 499 P.

BY REPEAT PHOTOGRAPHY THE AUTHOR ESTABLISHES THE PRINCIPAL FACTS ABOUT VEGETATIVE CHANGE. THE LOWER EDGE OF THE RANGE OF OAKS HAS MIGRATED UPWARD, THAT OF PALOVERDES HAS UNDERGONE SIMILAR DISPLACEMENT. DESERT GRASSLANDS HAVE DETERIORATED AND IN SOME CASES VANISHED, BEING REPLACED BY DESERT SCRUB. PROSOPIS JULIFLORA AND ACACIA VERNICOSA HAVE BEEN THE PRINCIPAL WOODY INVADERS. HISTORICAL DATA SUPPLEMENT VARIOUS HYPOTHESES RELATING CHANGES TO CULTURAL FACTORS SUCH AS MAN S INFLUENCE ON THE ECOLOGY THROUGH INTRODUCTION OF CATTLE, SUPPRESSION OF FIRE, AND PREDATOR CONTROL, BUT THE CONCLUSION DRAWN IS THAT THE REGION HAS PARTICIPATED IN A WORLDWIDE RECENT CLIMATIC FLUCTUATION, DECREASED RAINFALL, AND INCREASED TEMPERATURE, WITH CULTURAL FACTORS MERELY REINFORCING OR SUPPLEMENTING THE EFFECT OF CLIMATE.

OALS/WGM/NPS-ONS/SWERVE/ARIZONA/DESERT GRASSLAND/TIME LAPSE PHOTOGRAPHY/VEGETATION CHANGE/CLIMATIC-VEGETAL RELATIONSHIPS/CLIMATIC CHANGE/PERTURBATION/BURNING/GRAZING/ELEVATION/PLANT DISTRIBUTION/PLANT INVADERS/UNDESIRABLE PLANTS/PROSOPIS/CERCIDIUM/QUERCUS/GRASSLAND BIOME

97

HASTINGS, J.R./TURNER, R.M.

1965

THE CHANGING MILE; AN ECOLOGICAL STUDY OF VEGETATION CHANGE WITH TIME IN THE LOWER MILE OF AN ARID AND SEMI-ARID REGION.

UNIVERSITY OF ARIZONA PRESS, TUCSON. 317 P.

SURVEYS THE PRINCIPAL CLIMATIC AND ECOLOGICAL FEATURES OF THE SONORAN DESERT, REVIEWS THE REGIONS HISTORY, EMPHASIZING THE CULTURAL FACTORS THAT BEAR ON THE PROBLEMS OF VEGETATION CHANGE AND ARROYO CUTTING. THREE CHAPTERS COMPARE PHOTOGRAPHIC PAIRS SPANNING A PERIOD OF 80 YEARS: OAK WOODLAND, DESERT GRASSLAND, AND DESERT. VEGETATION CHANGES AND HYPOTHESIS THAT HAVE BEEN PROPOSED ARE PRESENTED AND REVIEWED. CONSIDERABLE ATTENTION IS GIVEN TO THE EFFECTS OF GRAZING,

RODENTS AND JACKRABBITS, FIRE, AND CLIMATIC CHANGE. THE AUTHORS CONCLUDE THAT A NEW VEGETATION HAS RESULTED FROM THE COMBINATION OF CLIMATIC AND CULTURAL STRESS DURING THE LAST 80 YEARS.

OALS/SOUTHWEST U.S./ARIZONA/NEW MEXICO/MEXICO/ARID LANDS/ARID CLIMATE /SEMIARID CLIMATE/EROSION/HISTORY/GRAZING/BURNING/ANIMAL DAMAGE/ PHOTOGRAPHY/SHRUBS/GULLY EROSION/BIOGEOGRAPHY/DESERT GRASSLAND/ CLIMATIC-VEGETAL RELATIONSHIPS/WOODLAND/DESERTS/ENVIRONMENTAL EFFECTS/ PROSOPIS/DESERTIFICATION/CLIMATIC CHANGE/DESICCATION/VEGETATION CHANGE

98

HAURY, E.W.

1958

POST-PLEISTOCENE HUMAN OCCUPATION OF THE SOUTHWEST. IN T.L. SMILEY ED., CLIMATE AND MAN IN THE SOUTHWEST, A SYMPOSIUM HELD BEFORE THE THIRTY-THIRD ANNUAL MEETING OF THE SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, APRIL 30TH, 1957, TUCSON, ARIZONA, P 69-75.

UNIVERSITY OF ARIZONA PRESS, TUCSON, ARIZONA.

MAN REACHED THE SOUTHWEST DURING A RETREAT PHASE OF THE LAST GLACIATION, PERHAPS JUST PRIOR TO THE MANKATO STAGE (DATING ABOUT 12 MILLENIA AGO). THIS WAS A PERIOD CHARACTERIZED BY CLIMATIC INSTABILITY. THE DEGREE OF MOBILITY WAS DIRECTLY RELATED TO THE ADVANCES MADE IN FOOD STORAGE AND PRESERVATION. THE CLIMATE WAS COOLER AND MOISTER, WITH SURFACE WATER MORE PLENTIFUL AND GROUND COVER DENSER. WITH ONSET OF THE THERMAL MAXIMUM ABOUT 5000 B.C. THE TEMPERATURE INCREASED. THE CHAIN REACTION OF REDUCED VEGETATION COVER, SHRINKAGE OF SURFACE WATER, LOSS OF LARGER GAME ANIMALS CAUSED MAN TO DEPEND UPON PLANTS AND NEW SKILLS. THE INCREASED ARIDITY AND CONSEQUENT REDUCTION OF SURFACE WATER TENDED TO HOLD MAN TO RELATIVELY SMALL AREAS WHERE WATER WAS AVAILABLE. THE MODIFICATION OF THE LANDSCAPE WAS LITTLE AFFECTED UNTIL PLANTING BECAME DOMINANT IN THE SUBSISTENCE PATTERN. 15 REFERENCES. (OALS)

OALS/SETTLEMENTS /SOUTHWEST U.S./ARIZONA/NEW MEXICO/NEVADA/ANIMAL POPULATIONS/PALEOCLIMATOLOGY/DISTRIBUTION PATTERNS/FOOD SUPPLY/ CLIMATIC CHANGE/DESICCATION/DESERTIFICATION/SURFACE WATERS/WATER LOSS/ SOIL-WATER-PLANT RELATIONSHIPS/SUCCESSION/ARID CLIMATE

99

HEADY, H.F.

1972

ECOLOGICAL CONSEQUENCES OF BEDOUIN SETTLEMENT IN SAUDI ARABIA. IN M.T. FARVAR AND J. P. MILTON, EDS., THE CARELESS TECHNOLOGY: ECOLOGY AND INTERNATIONAL DEVELOPMENT, P. 683-693.

NATURAL HISTORY PRESS, N.Y. 1030 P.

ONE UNPLANNED AND UNFORESEEN SIDE EFFECT OF THE OIL INDUSTRY IN SAUDI ARABIA HAS BEEN SETTLEMENT OF MANY BEDOUINS. THIS PAPER TRACES THE

RECENT DEVELOPMENT OF WATER AND GRAZING FOR DOMESTIC ANIMALS. GEOGRAPHIC CONSIDERATIONS ARE OUTLINED. THE GRAZING HISTORY IS REVIEWED, INCLUDING THE EFFECT OF WATER DEVELOPMENT BY OIL INTERESTS AND THE DROUGHT OF 1955-63 ON INTENSIFICATION OF SETTLEMENT. THE AUTHOR REPORTS ON NUMBERS OF GRAZING ANIMALS AND CONDITIONS OF THE RANGE. HYDROLOGICAL DEVELOPMENT OF WELLS WAS OFTEN POORLY CARRIED OUT, RESULTING IN EXCESS WATER, HIGH SALINITY AND POOR DRAINAGE. RECENTLY WATER MANAGEMENT PRACTICES HAVE BEEN IMPROVED. THE AUTHOR QUESTIONS THE USEFULNESS OF WATER-SPREADING SYSTEMS IN WADIS. DEPLETION OF WILDLIFE IS RELATED TO THE INTRODUCTION OF FOUR-WHEEL DRIVE VEHICLES. THE AUTHOR FEELS THAT MANY BEDOUINS CAN EASILY MOVE INTO MODERN SOCIETY, BUT THAT THEIR WAY OF LIFE IS THE BEST FOR EXPLOITATION OF THE RANGE RESOURCES. FOR THOSE THAT RETAIN THEIR NOMADIC EXISTENCE, HE SUGGESTS THAT MODERNIZATION OF BEDOUIN LIFE IN SITU WITH ALL THE SERVICES AVAILABLE FROM TECHNOLOGICAL AGRICULTURE AND OTHER ASPECTS OF MODERN SOCIETY SHOULD BE BROUGHT TO BEAR ON THE PROBLEMS OF LIVESTOCK PRODUCTION IN ARID REGIONS.

OALS/SAUDI ARABIA/ARABIAN DESERT/NOMADS/ENVIRONMENTAL EFFECTS/SOCIAL ASPECTS/ECONOMIC DEVELOPMENT/OIL FIELDS/WATER RESOURCES DEVELOPMENT/ WATER SPREADING/SALINITY/DROUGHTS/LIVESTOCK/GRAZING/REGIONAL GEOGRAPHY /WELLS/SETTLEMENTS/WILDLIFE

100

HENDERSON, T.J./CARLEY, W.J.

1971

PROJECT ARID DROP; A SUMMARY REPORT OF CLOUD SEEDING ACTIVITIES IN ARIZONA AS CONDUCTED BY ATMOSPHERICS, INCORPORATED, DURING THE PERIOD 16 JULY-12 AUGUST 1971.

ATMOSPHERICS, INC., FRESNO, CALIFORNIA. 14 P. USBR CONTRACT 14-06-D-7185. AVAILABLE NTIS AS PB-204 604. SWRA W72-08404.

CLOUD SEEDING ACTIVITIES WITH SILVER IODIDE IN ARIZONA DURING THE PERIOD JULY 16 THROUGH AUGUST 12, 1971, ARE SUMMARIZED. THESE CLOUD SEEDING EFFORTS WERE COORDINATED WITH THE FLIGHT AND RADAR ACTIVITIES OF METEOROLOGY RESEARCH BASED AT FLAGSTAFF, PLUS THE RADAR SURVEILLANCE PROVIDED BY THE BUREAU OF RECLAMATION AT SHOW LOW, ARIZONA. THE BEFORE-DURING-AFTER OBSERVATION OF SEEDED AND NONSEEDED SINGLE CUMULUS CELLS IN THE MODERATE DEVELOPMENT CATEGORY INDICATED A SIGNIFICANT MEASURE OF SUCCESS. RESULTS FROM TREATMENT OF SMALL CUMULUS CELLS IN AN AREA WHERE NONE WERE LEFT UNTREATED PRODUCED PRECIPITATION FROM ABOUT HALF OF THE TREATED CELLS, WHILE THE REMAINING CELLS PRODUCED ONLY VIRGA OR NO PRECIPITATION. PROPER TREATMENT OF CUMULUS CLOUDS INITIATED PRECIPITATION, AND ENHANCED THE TOTAL RAINFALL FROM CLOUDS WHERE PRECIPITATION WAS ALREADY IN PROGRESS. (USGS)

OALS/CLOUD SEEDING/ARIZONA/WEATHER MODIFICATION/ PRECIPITATION(ATMOSPHERIC)/ARTIFICIAL PRECIPITATION/ENVIRONMENTAL ENGINEERING

101

HOYANAGI, M.

1965

SAND-BURIED RUINS AND SHRINKAGE OF RIVERS ALONG THE OLD SILK ROAD IN THE TARIM BASIN.

JOURNAL OF GEOGRAPHY, TOKYO, 74(1):1-12,(2):55-75. MGA 17.8-469.

ARCHAEOLOGICAL, HISTORICAL, HYDROLOGICAL AND CLIMATIC FACTORS THAT MAY ACCOUNT FOR THE ABANDONMENT OF SITES IN THE TAKLA MAKAN DESERT IN THE TARIM BASIN ARE DISCUSSED. ABANDONMENT OF THE SITES IS ASSOCIATED WITH THE SHRINKAGE OF RIVERS AND WITH THE RETREAT OF GLACIERS AND THEIR GENERAL FLUCTUATION DURING HISTORICAL TIMES.

TAKLA MAKAN DESERT/TARIM BASIN/SINKIANG/CHINA/SANDS/ARCHAEOLOGY/ CLIMATIC CHANGE/OALS

102

HUMPHREY, R.R.

1953

THE DESERT GRASSLAND, PAST AND PRESENT.

JOURNAL OF RANGE MANAGEMENT 6(3):159-164. BA(27)31436.

A STUDY OF HISTORICAL AND VEGETATIONAL DATA SHOWS THAT THE DESERT GRASSLAND OF SOUTHWESTERN UNITED STATES AND NORTHERN MEXICO IS NOT TRUE CLIMAX. RATHER, IT IS A SUBCLIMAX MAINTAINED BY FIRE. TODAY, WITH FIRES LARGELY A THING OF THE PAST, THE TRUE CLIMAX OF LOW TREES, BRUSH, AND CACTI, WITH AN UNDERSTORY OF GRASSES AND LOW-GROWING SHRUBS IS DEVELOPING EXTENSIVELY ON AREAS THAT WERE ONCE GRASSES. (AUTHOR)

OALS/WGM/NPS-ONS/SWERVE/DESERT GRASSLAND/HISTORY/SOUTHWEST U.S./ MEXICO/CLIMAX/BURNING/VEGETATION CHANGE/PERTURBATION/GRASSLAND BIOME/ SUCCESSION/SONORAN DESERT/PROSOPIS/RANGE MANAGEMENT

103

HUMPHREY, R.R.

1958

THE DESERT GRASSLAND. A HISTORY OF VEGETATIONAL CHANGE AND AN ANAYLSIS OF CAUSES.

BOTANICAL REVIEW 24(4):193-252. (REPRINTED AS ARIZONA AGRICULTURAL EXPERIMENT STATION, BULLETIN 299).

EXTENSIVE PORTIONS OF THE DESERT GRASSLAND OF SOUTHERN ARIZONA, NEW MEXICO, AND SOUTHWESTERN TEXAS HAVE BEEN INVADED BY WOODY SPECIES. MESQUITE, CREOSOTE BUSH, CACTI OF THE GENUS OPUNTIA, BURROWEED, AND SNAKEWEED ARE AMONG THE PRINCIPAL INVADERS. THE PRINCIPAL FACTORS COMMONLY BELIEVED TO HAVE CAUSED THIS CHANGE ARE CHANGE OF CLIMATE, GRAZING BY DOMESTIC LIVESTOCK, PLANT COMPETITION, RODENTS AND FIRE. OF THESE VARIOUS FACTORS, CHANGE OF CLIMATE SEEMS TO HAVE HAD THE

LEAST EFFECT. FIRES THAT WERE FORMERLY FREQUENT AND WIDESPREAD WERE THE CHIEF AGENCY RESTRICTING SHRUB INVASION. SINCE FIRES HAVE BEEN CONTROLLED, THE INTRODUCTION OF DOMESTIC LIVESTOCK, PLANT COMPETITION, AND RODENTS HAVE BEEN EFFECTIVE AGENTS FAVORING WOODY PLANTS AT THE EXPENSE OF GRASSES.

APLOPAPPUS TENUISECTUS/VEGETATION CHANGE/OALS/WGM/NPS-ONS/DESERTS/ GRASSLAND BIOME/HISTORY/SUCCESSION/VEGETATION/ENVIRONMENTAL EFFECTS/ ARIZONA/NEW MEXICO/TEXAS/WOODY PLANTS /PROSOPIS/LARREA TRIDENTATA/ OPUNTIA/APLOPAPPUS//GUTIERREZIA/PLANT INVADERS/CLIMATIC CHANGE/ CLIMATE/GRAZING/LIVESTOCK//COMPETITION/PLANTS/RODENTS/BURNING/MEIGS SB

104

HUMPHREY, R.R./MEHRHOFF, L.A.

1958

VEGETATION CHANGES ON A SOUTHERN ARIZONA GRASSLAND RANGE.

ECOLOGY 39(4):720-726.

VEGETATION SURVEYS OF THE SANTA RITA EXPERIMENTAL RANGE WERE MADE IN 1904, 1934 AND 1954, AND ANALYZED TO DETERMINE CHANGES IN AREA AND ABUNDANCE OF CREOSOTEBUSH, BURROWEED, CHOLLA, AND MESQUITE. ALL INCREASED IN AREA AND ABUNDANCE FROM 1904 TO 1954. MAXIMUM INCREASE HAD OCCURRED BY 1934, BUT EXCEPT FOR BURROWEED, CONTINUED AT A SLOWER RATE FROM 1934 TO 1954. CLIMATE, GRAZING, RODENTS AND FIRE WERE FACTORS THAT MAY HAVE CONTRIBUTED TO THE VEGETATIONAL CHANGES NOTED. NO APPARENT CHANGE IN CLIMATE COULD BE DETECTED. GRAZING BY DOMESTIC LIVESTOCK AFFECTED THE COMPOSITION OF THE VEGETATION (BY SEED DISSEMINATION, SELECTIVE GRAZING AND REMOVAL OF GRASS THAT FORMERLY SERVED AS FUEL FOR RANGE FIRES). RODENTS BURY MESQUITE SEEDS AND TRANSPORT CHOLLA JOINTS, THUS SERVING TO PROPAGATE THOSE PLANTS. FIRES MAINTAINED DESERT GRASSLAND PRIOR TO THE INTRODUCTION OF LIVESTOCK. SHRUB INVASION OF SOUTHERN ARIZONA GRASSLANDS IS DUE TO REDUCTION OF RANGE FIRES. (OALS)

OALS/WGM/NPS-ONS/SWERVE/ARIZONA/DESERT GRASSLAND/GRASSLAND BIOME/ SANTA RITA EXPERIMENTAL RANGE/VEGETATION CHANGE/APLOPAPPUS TENUISECTUS /GRAZING/RODENTS/PROSOPIS/BURNING/RANGE MANAGEMENT/BRUSH CONTROL

105

HUNTINGTON, E.

1914

CLIMATIC CHANGES.

GEOGRAPHICAL JOURNAL 44(2):203-210.

THIS ARTICLE DEALS WITH WHAT ARE KNOWN AS LONG-PERIOD CLIMATIC PULSATIONS AND PROGRESSIVE DESICCATION OF THE EARTH. THE GENERAL CONCLUSION IS THAT IT IS NOT POSSIBLE TO SAY WHETHER THE EARTH AS A WHOLE IS BECOMING WETTER OR DRIER. APPARENTLY THERE HAS BEEN NO GENERAL CHANGE OF CLIMATE WITHIN HISTORIC TIMES.

OALS/CLIMATOLOGY/ARID LANDS/METEOROLOGY/SYNOPTIC ANALYSIS/DESICCATION /DESERTIFICATION/CLIMATIC CHANGE

106

HUNTINGTON, E. ET AL

1914

THE CLIMATIC FACTOR AS ILLUSTRATED IN ARID AMERICA.

CARNEGIE INSTITUTION OF WASHINGTON, PUBLICATION 192. 341 P.

EVIDENCE REGARDING THE CHARACTER AND SEQUENCE OF CHANGES IN CLIMATE DURING THE LAST TWO OR THREE THOUSAND YEARS, THE PERIOD COVERED BY HISTORY AND MAN S LATER DEVELOPMENT, IN THE DRIER PORTIONS OF AMERICA FROM GUATEMALA TO IDAHO IS ASSEMBLED AND DISCUSSED. EVIDENCE WAS DERIVED FROM STUDIES OF THE INFLUENCE OF THE PRESENT CLIMATIC CONDITIONS UPON PHYSIOGRAPHY AND THE HABITS AND DISTRIBUTION OF PLANTS AND ANIMALS THROUGH TRACES OF ANCIENT HUMAN OCCUPATION OF THE AREA. DATA ON CLIMATIC CHANGE WAS DERIVED FROM DOUGLASS DEVELOPMENT OF TREE-RING MEASUREMENT. CONCLUSIONS ARE THAT NORTH AMERICA HAS BEEN SUBJECT TO CLIMATIC PULSATIONS SIMILAR TO THOSE IN THE OLD WORLD, RATHER THAN GRADUAL AND REGULAR CHANGE.

OALS/CLIMATIC CHANGE/ARID CLIMATE/NORTH AMERICA/DENDROCHRONOLOGY

107

HUZAYYIN, S.

1955

CHANGES IN CLIMATE, VEGETATION, AND HUMAN ADJUSTMENT IN THE SAHARO-ARABIAN BELT WITH SPECIAL REFERENCE TO AFRICA. IN W.L. THOMAS, JR., ED., MAN S ROLE IN CHANGING THE FACE OF THE EARTH, P. 304-323.

UNIVERSITY OF CHICAGO PRESS, CHICAGO.

THE DELIMITATION OF DESERT FROM SURROUNDING AREAS HAS ALWAYS BEEN VAGUE, ENCROACHMENT EITHER OF THE DESERT ON ITS BORDERING LANDS OR VICE VERSA FREQUENT. A PALEOGEOGRAPHIC RETROSPECT IS OUTLINED ON THE BASIS OF PAST CLIMATE VEGETATION AND HUMAN ACTIVITIES. PROBLEMS OF INTERPRETATION OF DATA AND NON-EXISTENCE OF DATA ARE DISCUSSED. THE QUESTION IS NOT SIMPLY ONE OF EXPANSION OR CONTRACTION OF THE DESERT BELT, BUT RATHER ONE OF PENETRATION OF EITHER MEDITERRANEAN OR SUDANESE AND SUBEQUATORIAL CONDITIONS. THIS WAS ACCOMPANIED BY PENETRATION OF FAUNA, FLORA, AND MAN. BECAUSE OF PRECARIOUS DEPENDENCE ON SMALL AMOUNTS OF PRECIPITATION, MINOR FLUCTUATIONS (10-15 MM./YEAR) COULD HAVE RESULTED IN DRASTIC CHANGES. CLIMATIC CHANGES DURING PLUVIAL PERIODS ARE OUTLINED, BUT DETAILS REMAIN IN QUESTION. POST-PLEISTOCENE CHANGES ARE DISCUSSED IN RELATION TO THE DEVELOPMENT OF PALEOLITHIC, MESOLITHIC, AND NEOLITHIC STAGES OF CIVILIZATION AND THE DEVELOPMENT OF AGRICULTURE. THE NEOLITHIC WET PHASE STARTED ABOUT THE MIDDLE OF THE SIXTH MILLENNIUM B.C. AND CONTINUED FOR ABOUT 3000 YEARS BEFORE IT GAVE WAY TO GRADUAL DESICCATION DURING THE HISTORIC PHASE. CONDITIONS DURING HISTORIC TIMES ARE PRESENTED. DETERMINING WHETHER DESERT ENCROACHMENT IS DUE TO MAN S INFLUENCE OR CLIMATIC FLUCTUATIONS IS VERY DIFFICULT AND SUBJECT TO CIRCULAR REASONING. THE COMPLEXITIES OF UNDERSTANDING THESE PROBLEMS REQUIRE A COORDINATED EFFORT OF A TEAM OF BROADLY

TRAINED SPECIALISTS TO INTERGRATE THE EVIDENCE FROM DIVERSE DISCIPLINES.

OALS/ARID LANDS/ARID CLIMATE/SEMIARID CLIMATE/AFRICA/SOCIAL ASPECTS/ HISTORY/PALEOCLIMATOLOGY/CLIMATOLOGY/BIOGEOGRAPHY/CLIMATIC VEGETAL RELATIONSHIPS/ARABIAN DESERT/GEOLOGIC TIME/AFRICA/DESERTIFICATION/ SAHARA/CLIMATIC CHANGE

108

IBRAHIM, K.M.

1967

SUMMARY REPORT AND BIBLIOGRAPHY (ON) THE PASTURE, RANGE AND FODDER CROP SITUATION IN THE NEAR EAST.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME. 159 P. WAERSA (10)3047.

THIS COMPILATION OF DATA COVERS LIBYA, EGYPT, THE SUDAN REPUBLIC, SOMALIA, ETHIOPIA, SAUDI ARABIA, YEMEN, KUWAIT, JORDAN, LEBANON, SYRIA, CYPRUS, TURKEY, IRAQ, IRAN, PAKISTAN AND AFGHANISTAN. FOR EACH OF THESE 17 COUNTRIES, A CHAPTER PRESENTS BRIEF INFORMATION ON NATURAL GRASSLANDS, PASTURES AND FODDER CROPS, PROBLEMS CONNECTED WITH GRAZING AND ADEQUATE FEEDING OF ANIMALS, AND WORK DONE TO IMPROVE THE SITUATION, FOLLOWED BY A LIST OF PUBLICATIONS. THE SUMMARY HAS BEEN ISSUED TO PROMOTE CO-ORDINATION OF REGIONAL RESEARCH PROGRAMMES. A COMMON PROBLEM IS THE DETERIORATION OF THE NATURAL VEGETATION IN GRAZING AREAS THROUGH OVERSTOCKING, ACCELERATED BY THE CONSTRUCTION OF WELLS AND RECLAMATION OF LAND FOR AGRICULTURAL CROPS.

BIBLIOGRAPHIES/BIBLIOGRAPHIES/OALS/MIDDLE EAST/PASTURES/GRAZING/ LIVESTOCK/PERTURBATION/CROP PRODUCTION/FORAGE SUPPLY/RANGES

109

IBRAHIM, K.M.

1969

THE CONTROL OF DRIFTING SANDS IN THE NORTH COASTAL REGION OF UAR(UNITED ARAB REPUBLIC).

PAKISTAN JOURNAL OF FORESTRY 19(4):456-471. BA(51)128378.

RELATIVE HUMIDITY INCREASES AND EVAPORATION DECREASES DURING THE DRY SUMMER DUE TO THE EFFECT OF THE MEDITERRANEAN SEA. DEW IS CONSIDERED AS A SOURCE OF MOISTURE FOR SAND DUNES. STUDIES ON MOVEMENT OF SAND OVER THE COASTAL RANGELANDS WERE CARRIED OUT TO INVESTIGATE THE BASIS OF SAND DUNES FIXATION. BOTH WIND VELOCITY AND PATTERN OF WIND DIRECTION DETERMINE THE SHAPE OF THE DUNE AND ITS RATE OF MOVEMENT. THE PHYSICAL CHARACTERISTICS OF BLOWN SAND WHICH FORM THE DIFFERENT TYPES OF DUNES ARE MENTIONED. METHODS OF CONTROL ARE BRIEFLY REPORTED. METHODS OF SAND DUNES FIXATION ARE DESCRIBED. DETAILED ECOLOGICAL STUDIES ARE NEEDED AFTER SAND FIXATION BY ARTIFICIAL METHODS OR THROUGH REHABILITATION TO AVOID FURTHER DISTURBANCES.

OALS/EGYPT/MEDITERRANEAN CLIMATE/COASTAL DESERTS/GEOMORPHOLOGY/SAND DUNES/WIND ACTION/PARTICLE SIZE/SAND CONTROL

110

ISRAEL NATIONAL COUNCIL FOR RESEARCH AND DEVELOPMENT

1971

SYMPOSIUM ON ARTIFICIAL RAIN, SHORESH, 1970, PROCEEDINGS.

SAME AS AUTHOR, JERUSALEM. 92 P. MGA 23.4-10.

THESE PROCEEDINGS CONTAIN THE RESULTS OF RESEARCH PROJECTS AIMED AT THE ARTIFICIAL INCREASE OF RAINFALL, ESPECIALLY AS THE PREVAILING CONDITIONS IN ISRAEL DEMAND NEW AND BETTER SOURCES OF WATER. BACKGROUND PAPERS MAKE A LIMITED SURVEY OF THE VARIOUS APSECTS OF RAIN FORMATION (ICE CRYSTALIZATION AND COLLISION-COALESCENCE PROCESSES IN PARTICULAR); OTHERS PRESENT EXPERIMENTAL RESULTS, AND GIVE POSSIBLE EXTENSIONS TO DROPLET FORMATION THEORY AND TO POTENTIAL RAIN MAKING APPLICATIONS. ATTENTION IS ALSO GIVEN TO REDUCTION OF EVAPORATION LOSSES BY SURFACTANTS AND THE PHENOMENON OF VIRGAE.

OALS/ARTIFICIAL PRECIPITATION/ISRAEL/CLOUD SEEDING/WEATHER MODIFICATION/WATER YIELD IMPROVEMENT/EVAPORATION CONTROL

111

JENIK, J./HALL, J.B.

1966

THE ECOLOGICAL EFFECTS OF THE HARMATTAN WIND IN THE DJEBOBO MASSIF (TOGO MOUNTAINS, GHANA).

JOURNAL OF ECOLOGY 54(3):767-779. GA 688-1132.

OBSERVATIONS OF MICROCLIMATE AND VEGETATION INDICATE A MARKED ASYMMETRICAL EFFECT, TOWARDS RIDGE TOPS, OF THE WARM DESICCATING, DRY-SEASON N.E. HARMATTAN WIND. ON WINDWARD SLOPE EFFECTS ARE SOIL EROSION, A STONY SURFACE, LACK OF HUMUS, DEFICIENCY OF SOIL MOISTURE, FLAG-FORMS OF TREES AND SHRUBS, DRIFT OF PLANT PARTS AND SEEDS AND RAPID SPREAD OF FIRES. ON LEEWARD SLOPES EFFECTS ARE FINE SOIL SEDIMENTATION, FAVORABLE NUTRIENT AND MOISTURE CONDITIONS, LEAF LITTER AND HUMUS ACCUMULATION, SEED SEDIMENTATION, AND RELATIVE PROTECTION AGAINST FIRES. UNUSUAL CLIMATIC EXTREMES WERE ASSOCIATED WITH HARMATTAN WEATHER, E.G. HIGH WIND VELOCITY, EXCEPTIONALLY HIGH EVAPORATION AND VERY LOW VALLEY-BOTTON MINIMUM TEMPERATURES (INCREASED NIGHT-TIME OUTWARD RADIATION THROUGH THE DRY AIR), WHICH LAST EXPLAINS THE PRESENCE OF MONTANE SPECIES AT LOW ALTITUDES. ANNUAL FIRES CONFOUND RELATIONSHIPS, BUT IT IS UNLIKELY THAT SAVANNA WOODLAND COULD EXIST ON THE WINDWARD SLOPES AS IT DOES ON THE LEEWARD. TREE AND HERBS SPECIES OF THE TREE-STEPPE TO WINDWARD ARE XEROMORPHIC, THE EXTREME DESICCATION PRODUCING SEMI-DESERT COMMUNITIES.

OALS/MICROCLIMATOLOGY/CLIMATIC-VEGETAL RELATIONSHIPS/SEASONAL/ HARMATTAN /SOIL EROSION /SOIL MOISTURE/SOIL PHYSICS/DRY SEASONS/WIND VELOCITY/DESICCATION/XEROPHYTES/DESERTIFICATION

112

JONES, B.

1938

DESICCATION AND THE WEST AFRICAN COLONIES.

GEOGRAPHICAL JOURNAL 91(5):401-423.

THE AUTHOR STUDIED CONDITIONS IN THIS AREAS AS A MEMBER OF THE ANGLO-FRENCH FORESTRY COMMISSION. HE DISCUSSES STEBBING S THEORY OF DESERTIFICATION AND POINTS OUT CONTRADICTORY DATA WHICH SEEM TO INDICATE THAT STEBRING WAS OVERSTATING HIS CASE. THE AUTHOR FINDS THAT ENCROACHMENT OF SAND IS OF MINOR IMPORTANCE AND DOES NOT INDICATE ANY THREAT TO THE AREA. THE COMMISSION CONCLUDED THAT THE PRESENT FOREST FORMATIONS ARE NOT BEING THREATENED BY CHANGING CLIMATE OR BY A SINKING WATER TABLE. IN CERTAIN AREAS TREES MAY DIE FOR LACK OF WATER WHILE STANDING IN FLOODED AREAS. THIS IS CAUSED BY AN IMPERVIOUS CLAY SOIL LAYER KNOWN AS A TUBKUNA. IN ARID AREAS SHIFTING AGRICULTURE MAY LEAD TO SO GREAT A DETERIORATION IN THE FERTILITY OF THE SOIL THAT THE ORIGINAL FOREST FORMATIONS ARE EVENTUALLY UNABLE TO RE-ESTABLISH THEMSELVES, EVEN UNDER PROTECTION. RAINFALL REDUCTION HAS NOT BEEN ADEQUATELY DOCUMENTED. WATER-TABLE LEVELS APPEAR STABLE. REDUCTION IN SURFACE WATER AND STREAM CAPTURE MAY BE LOCALLY IMPORTANT. MIGRATIONS OF POPULATIONS ARE ATTRIBUTABLE TO ECONOMIC LOSS OF OLD TRADE RDUTES AND POLITICAL FACTORS.

OALS/WEST AFRICA/SAHARA/DESICCATION/DESERTIFICATION/DEGENERATION/ VEGETATION CHANGE

113

JORDAN, G.L./MAYNARD, M.L.

1970

THE SAN SIMON WATERSHED: REVEGETATION.

PROGRESSIVE AGRICULTURE IN ARIZONA 22(6):4-7. SWRA W71-06223.

IN THE ABSENCE OF COMPETITION FROM GRASS, SHRUBS TEND TO REINVADE AREAS WHERE THEY HAVE BEEN CLEARED. CULTURAL PROCEDURES FOR GRASS ESTABLISHMENT ARE DESCRIBED AND EVALUATED. ROOT PLOWING PROVED TO BE THE MOST EFFECTIVE METHOD, BOTH FOR SHRUB CONTROL AND THE ESTABLISHMENT OF ERAGROSTIS LEHMANNIANA. DEPENDING ON PRECIPITATION, EMERGENCE AND DEVELOPMENT OF E. LEHMANNIANA USUALLY OCCURRED FROM JULY 15 TO SEPTEMBER 15. LACK OF PRECIPITATION AND LOW TEMPERATURES LIMIT GERMINATION DURING THE REMAINDER OF THE YEAR. E. LEHMANNIANA APPEARS TO BE THE MOST DEPENDABLE GRASS TO SEED IN THIS AREA. THE SEASONAL DISTRIBUTION OF RAINFALL IS AN ESPECIALLY CRITICAL FACTOR; 5.5 INCHES OF SUMMER RAINFALL IS CLOSE TO THE MINIMUM REQUIRED BY E. LEHMANNIANA. (OALS)

ERAGROSTIS LEHMANNIANA/OALS/WGM/SAN SIMON WATERSHED/ARIZONA/BRUSH CONTROL/UNDESIRABLE PLANTS /SHRUBS/WOODY PLANTS/SEEDING/PLANT INVADERS/INTRODUCED SPECIES/GRASSES /EROSION CONTROL/EROSION/GULLY EROSION/GROUND COVER/LAND MANAGEMENT/WATERSHED MANAGEMENT/RANGE MANAGEMENT/REVEGETATION/GERMINATION/VIABILITY/SUMMER/SEASONAL/ RAINFALL/TEMPERATURE/FORAGE GRASSES/PRODUCTIVITY/PERTURBATION/ COMPETITION/DESERT GRASSLAND/MECHANICAL CONTROLS/SUMMER PRECIPITATION/ FORAGE PRODUCTION/SWERVE

114

JOSHI, K.L.

1969

PROBLEMS OF DESERT AGRICULTURE IN PUNJAB HARYANA AND WEST RAJASTHAN.

SCIENCE AND CULTURE 35(10):550-555. MGA 21.110463. GA 71C-0080. SWRA W71-10486.

UNLIKE MANY DESERTS, THE RAJASTHAN IS A SETTLED AGRICULTURAL REGION WHERE CROPPING AND GRAZING ARE THE MAJOR INDUSTRIES. EXAMINATION OF THE AREA REVEALS A RANDOM VARIATION IN DISTRIBUTION OF CULTIVATED ACREAGE. DUE TO HIGH IRREGULARITIES IN AMOUNT AND DISTRIBUTION OF RAINFALL, THE DESERT SANDS ARE ENCROACHING ALONG THE DISCONTINUOUS FRINGES OF CULTIVATED STRIPS AND THE FARMERS ARE CONSTANTLY INVOLVED IN OCCUPANCE EXTENSION DURING BETTER RAINFALL YEARS AND STRUGGLES AGAINST APPROACHING DETERIORATION IN POORER YEARS. THE MOST CRITICAL COMPLEX OF VARYING NATURAL FACTORS INFLUENCING CROPPED AREAS IS THE PERIODIC ADVANCE OR RECESSION OF SAND IN PROPORTION TO WIND FORCE AND LOCALLY CHANGING DIRECTION IN COMBINATION WITH IRREGULARITIES IN RAINFALL AND UNDERGROUND WATER TABLE. THE PROBLEMS FACING AGRICULTURE ARE REVIEWED IN DETAIL WITHIN THE BROAD PATTERNS OF DESERT FORMATIONS IN THE RAJASTHAN. (OALS)

OALS/RAJASTHAN/INDIA/DESERTS/DESERTIFICATION/WIND ACTION/SAND DESERTS /MOISTURE DEFICIT/GRAZING

115

KASSAS, M.

1970

DESERTIFICATION VERSUS POTENTIAL FOR RECOVERY IN CIRCUM-SAHARAN TERRITORIES. IN H.E. DREGNE, ED., ARID LANDS IN TRANSITION, P. 123-142.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, PUBLICATION 90. 524 P. SWRA W71-08136.

DESERTIFICATION IS THE GRADUAL SPREAD OF A DESERT INTO ADJOINING SEMIARID LANDS THROUGH THEIR DETERIORATION. THIS INVOLVES PROCESSES OF PERENNIAL PLANT COVER REDUCTION, FLORAL IMPOVERISHMENT, SOIL EROSION, MOBILE AND SAND DUNE FORMATION AND DESERT PAVEMENT ESTABLISHMENT. THE USUAL FACTORS RESPONSIBLE FOR THIS PROCESS ARE LIVESTOCK OVERGRAZING, CEREAL CULTIVATION, THE CUTTING OF WOODY SPECIES AND OTHER NATURAL VEGETATION MISMANAGEMENT PROBLEMS. IT IS STRESSED THAT THE DYNAMIC EQUILIBRIUM OF VEGETATION COVER IN ARID AND SEMIARID LANDS COMBINED WITH THIN SOILS AND LOW RAINFALL RENDER THESE FRAGILE ECOSYSTEMS SUBJECT TO LARGE DEGENERATIVE CHANGES AS A RESULT OF SMALL DISTURBANCES. PROGRESSIVE VEGETATIONAL DEGENERATION IS DESCRIBED IN THE MIDLAND BELT OF THE SUDAN AS A RESULT OF THE CLEARING OF NATIVE VEGETATION FOR THE EXPLOITATION OF GUM ARABIC. DUE TO POPULATION PRESSURES SUCH EXPLOITATION IS COMMON. A NUMBER OF PLANT AND WATER CONSERVATION PROJECTS DESIGNED TO RETARD THE DESERTIFICATION PROCESS ARE DESCRIBED AND CRITICIZED. THESE INCLUDE ENCLOSURE EXPERIMENTS, WATER RESERVOIR CONSTRUCTION, WATER REDISTRIBUTION

SYSTEMS AND AFFORESTATION. SO FAR, THEIR EFFECTIVENESS HAS BEEN LIMITED. THE AUTHOR CALLS FOR AN END TO DESTRUCTIVE PRACTICES AND AN INTEGRATED RATIONAL PROGRAM OF LAND RECOVERY PRACTICES. (OALS)

OALS/DESERTIFICATION/SAHARA/SUDAN/DEGENERATION/GRAZING/LAND MANAGEMENT/VEGETATION CHANGE/PERTURBATION/SOIL EROSION

116

KASSAS, M.

1971

THE RIVER NILE ECOLOGICAL SYSTEM: A STUDY TOWARDS AN INTERNATIONAL PROGRAMME.

BIOLOGICAL CONSERVATION 4(1):19-25. SWRA W72-08894.

THE BASIN OF THE RIVER NILE IS ABOUT 2.9 MILLION SQUARE KILOMETERS IN AREA AND ENCOMPASSES AN ECOLOGICAL REGION COMPRISING MOST OF CENTRAL AND NORTHEASTERN AFRICA. WITHIN THIS BROAD REGION THE NILE IS NOT MERELY A RIVER BUT ALSO A COMPLEX SYSTEM COMPRISING VARIOUS WATER BODIES (MARSHES, SWAMPS, LAKES, CANALS, DRAINS, ETC.) AND LANDFORMS (HIGHLANDS, PLAINS, VALLEYS, ETC.). NATURAL AGENCIES INFLUENCING IT INCLUDE GEOMORPHIC PROCESSES, ESPECIALLY EROSION AND SEDIMENTATION, CLIMATIC CHANGES, AND TECTONIC EVENTS. MAN S INFLUENCES ON THE RIVER INCLUDE BARRAGES, DAMS AND VARIOUS DIVERSION SYSTEMS. FUTURE PROJECTS WILL DRAIN SWAMPS, IMPOUND MORE WATER, DRY UP UP-STREAM RIVULETS AND INFLUENCE VARIOUS FORMS OF LAND USE SO AS TO INCREASE THE TOTAL SUM OF EROSION, OVERGRAZING, AND DESERTIFICATION. MAN HAS MANAGED TO DESTROY THE NATURAL BALANCE BUT HAS INVARIABLY FAILED TO REPLACE IT BY AN ARTIFICIAL BALANCE. EPIDEMICS, PESTS AND OTHER DISASTERS MAY RESULT FROM ECOLOGICAL IMBALANCES EXACERBATED BY UNWISELY USED MODERN TECHNOLOGY. AN OUTLINE IS PRESENTED FOR A RATIONAL PROGRAM OF INTERNATIONAL MANAGEMENT OF THE RIVER BASIN. (OALS)

OALS/RIVER BASINS/ECOSYSTEMS/ARID LANDS/WATER RESOURCES DEVELOPMENT/ REGIONAL ANALYSIS/GEOMORPHOLOGY/LAND USE/NATURAL RESOURCES/WATER CONSERVATION/VEGETATION EFFECTS/EROSION/SEDIMENTATION/DAMS/AFRICA/NILE RIVER/DESERTIFICATION/SETTLEMENTS/LAND MANAGEMENT/ENVIRONMENTAL EFFECTS

117

KAUL, R.N. ED

1970

AFFORESTATION IN ARID ZONES.

W. JUNK, THE HAGUE. 435 P. (MONOGRAPHIAE BIOLOGICAE, 20)

COVERS SEVEN MAJOR WORLD ARID REGIONS, EXCLUDING MEXICO, BRAZIL, AND SOUTHERN AFRICA. RECOMMENDS PLANTING MATERIALS AND TECHNIQUES TO MEET THE NEEDS OF SPECIFIC AREAS AND INCLUDES ENOUGH INFORMATION ON VARIOUS ENVIRONMENTS TO ENABLE INTRODUCTION OF SPECIES FROM ONE AREA TO ANOTHER. DISCUSSIONS OF ENVIRONMENT INCLUDE MAGHREB OF AFRICA, TUNISIA, ALGERIA, AND MOROCCO, INDO-PAKISTAN, U.S.S.R., CENTRAL ASIA,

ARGENTINA, AND AUSTRALIA. OUTSTANDING VEGETATION DISCUSSIONS INCLUDE INDO-PAKISTAN, ARGENTINA, U.S.S.R., AND CENTRAL ASIA. THE AIMS OF AFFORESTATION GIVE HIGH PRIORITY TO STABILIZATION OF SURFACE MATERIALS AND THE PREVENTION OF EROSION. THE CHOICE OF SPECIES IS LARGELY DEPENDENT ON NEEDS FOR SPECIFIC PURPOSES AND THE AVAILABILITY OF SUITABLE SPECIES. EXOTICS ARE GENERALLY MORE WIDELY USED THAN NATIVE SPECIES AND INCLUDE EUCALYPTUS, ESPECIALLY, AS WELL AS ACACIA, PROSOPIS, AND TAMARIX. (OALS)

OALS/AFFORESTATION/ARID LANDS/PLANT COVER/REFORESTATION/ PHYTOGEOGRAPHY/AFRICA/TUNISIA/ALGERIA/MOROCCO/INDIA/PAKISTAN, WEST/ USSR/EROSION CONTROL/INTRODUCED SPECIES/EUCALYPTUS/ACACIA/PROSOPIS/ TAMARIX/ECOSYSTEMS/SHELTERBELTS /DESERTIFICATION

118

KAUL, R.N./THALEN, D.C.P.

1971

RANGE RESOURCES OF IRAQ, A PROBLEM ANALYSIS.

INSTITUTE FOR APPLIED RESEARCH ON NATURAL RESOURCES, ABU GHRAIB, IRAQ, TECHNICAL REPORT 20. 31 P.

THE AUTHORS REVIEW THE RANGE RESOURCES OF IRAQ; PAST, PRESENT AND FUTURE. THE DEMAND FOR LIVESTOCK PRODUCTS HAS RISEN SHARPLY DURING THE PAST DECADE AND IS EXPECTED TO CONTINUE TO RISE. A REVIEW OF PAST WORK ON CLIMATOLOGY, SOILS, HYDROLOGY AND VEGETATION PRECEDES A DISCUSSION OF RANGE UTILIZATION AND LIVESTOCK PRODUCTION. THE NEED FOR INCREASED STRESS ON THE DEVELOPMENT OF CULTIVATED FODDER AND PASTURES IS OUTLINED AS WELL AS THE NEED FOR ACCURATE CENSUS OF LIVESTOCK. THE PRESENT SITUATION CONCERNING RANGE AND CULTIVATED FODDER RESOURCES IS DESCRIBED FOR 5 AGRO-CLIMATIC REGIONS. SOME RANGE LAND HAS BEEN TURNED TO PRODUCTION OF WHEAT, BARLEY AND DATES; PRODUCTION AND YIELDS ARE LOW. THE USE OF NATIVE RANGELANDS BY VARIOUS TRIBES OF PASTORAL NOMADS AND THEIR INFLUENCE ON RANGE CONDITIONS IS CONSIDERED. PRESENT PROBLEMS ARE OUTLINED AND A SERIES OF POSSIBLE REMEDIES ARE PROPOSED INCLUDING; FORMATION OF AN AGENCY TO ORGANIZE ACTIVITIES IN RANGE MANAGEMENT, ESTABLISHMENT OF HOLDING CENTERS RESEEDING, WATER MANAGEMENT AND RESEARCH PROGRAMS.

OALS/IRAQ/RANGE MANAGEMENT/FORAGE PRODUCTION/LAND USE/NOMADS/SOCIAL ASPECTS/LIVESTOCK/ARABIAN DESERT/WADIS/WATER CONSERVATION/RANGES/ FORAGE PLANTS/PASTURES/FORAGE SUPPLY/GRAZING/CARRYING CAPACITY

119

KELLEY, J.C.

1952

FACTORS INVOLVED IN THE ABANDONMENT OF CERTAIN PERIPHERAL SOUTH-WESTERN SETTLEMENTS.

AMERICAN ANTHROPOLOGIST 54(3):356-387.

MARKED CONTRACTION IN THE AREA OCCUPIED BY FARMING PEOPLES IN THE VICINITY OF LA JUNTA, COLORADO, OCCURRED DURING THE FIRST HALF OF THE EIGHTEENTH CENTURY. THIS MOVEMENT RESULTED FROM THE DISTURBANCE OF A

DELICATE ECOLOGICAL BALANCE EXISTING BETWEEN THE PRINCIPAL SUBSISTENCE LIFE ZONES AND THE APACHE AND PUEBLOAN PEOPLES OF THE REGION. THE HYPOTHESIS HAS BEEN ADVANCED THAT THIS DISTURBANCE IN ECOLOGICAL BALANCE WAS PRODUCED BY A SLIGHT ADVERSE FLUCTUATION IN ANNUAL OR SEASONAL RAINFALL IN THIS REGION. IT MAY BE INFERRED FROM THIS THAT A PREVIOUS PERIOD OF MORE FAVORABLE CLIMATIC CONDITIONS IN THE PREVIOUS CENTURY HAD ALLOWED THE ORIGINAL DEVELOPMENT OF THE NOMAD-SEDENTATE SYMBIOTIC RELATIONSHIP.

OALS/SOUTHWEST U.S./COLORADO/SOCIAL ASPECTS/ PRECIPITATION(ATMOSPHERIC)/DROUGHTS/SEMIARID CLIMATE/SETTLEMENTS/ PERTURBATION/CLIMATIC CHANGE/INDIANS OF NORTH AMERICA

120

KELLOGG, C.E.

1953

POTENTIALITIES AND PROBLEMS OF ARID SOILS. IN DESERT RESEARCH. PROCEEDINGS, INTERNATIONAL SYMPOSIUM HELD IN JERUSALEM, MAY 7-14, 1952.

RESEARCH COUNCIL OF ISRAEL, SPECIAL PUBLICATION 2:19-42.

IT IS ESTIMATED THAT PERHAPS 80 MILLION ADDITIONAL HECTARES OF ARID SOILS COULD BE IRRIGATED ECONOMICALLY IF THEY WERE SELECTED AND MANAGED SKILLFULLY, UNDER ADEQUATE ADMINISTRATIVE SCHEMES. CHARACTERISTICS OF IRRIGATED ARID SOILS DIFFER SIGNIFICANTLY FROM THOSE THAT RECIEVE WATER FROM NATURAL DRAINAGE. ACCURATE PREDICTIONS OF THE OUTCOME OF MANAGEMENT PRACTICES ON DIFFERENT KINDS OF ARID SOILS ARE NECESSARY. THIS CAN BE ACCOMPLISHED BY AN ACCURATE APPRAISAL OF SITUATIONS BY A TEAM OF EXPERTS. A GENERAL PROCEDURE FOR EXPLORING AND DEVELOPING AREAS OF ARID SOILS IS OUTLINED BRIEFLY. THE PAPER PRESENTS A DEFINITION OF ARID SOILS, THE GEOGRAPHY, THE CHARACTERISTICS, THE PROPORTION OF NORMAL SOILS IN ARID LANDS, SOIL-FORMING PROCESSES, AND SOIL QUALITIES. ALSO DISCUSSED ARE SPECIFIC IDEAS FOR COMBINING RESOURCE USE; STEPS FOR ORDERLY DEVELOPMENT; AND SUMMARY OF RESEARCH NEEDS. THE AUTHOR REPEATEDLY EMPHASIZES THAT UNLESS ALL ASPECTS ARE INVESTIGATED INTENSIVELY BEFORE PROJECTS START THEY ARE INVITING FAILURE. THE THREAT OF STARTING CATASTROPHIC SOIL BLOWING CAUTIONS AGAINST UNNECESSARY DISTURBANCE OF SANDY ARID SOILS UNLESS SUBSEQUENT FIXATION THROUGH IRRIGATED PLANTINGS IS REASONABLY CERTAIN.

OALS/PERMEABILITY/SOIL STRUCTURE/SOIL TEXTURE/SOIL CLASSIFICATIONS/ SOIL MANAGEMENT/B HORIZON/SALINE SOILS/IRRIGATION EFFECTS/ DESERTIFICATION

121

KLINTWORTH, H.

1948

DESERT ENCROACHMENT OVER THE KAROO.

FARMING IN SOUTH AFRICA 23:723-728.

CLIMATIC CHANGE IS BELIEVED TO PARTIALLY CAUSE THE ADVANCEMENT OF THE DESERT. IT IS NOTED THAT THE TOTAL RAINFALL HAS DECREASED DURING THE

LAST 50 YEARS OR SO, WITH AN INCREASE IN THE FREQUENCY OF HOT WESTERLY WINDS, WHICH DESICCATE THE LAND. THIS THEORY HAS NOT FULLY BEEN SUBSTANTIATED BY METEOROLOGICAL FACTS, BUT THERE IS SOME EVIDENCE THAT THE CLIMATE OF SOUTH AFRICA HAS ALTERNATED BETWEEN MOIST AND DRY PERIODS. IT IS CERTAIN THAT ANY DETERIORATION WHICH HAS TAKEN PLACE IN THE KAROO CAN BE EXPLAINED ON THE BASIS OF A FAULTY SYSTEM OF LAND-USE. THE LOSS OF GRASS COVER BY OVER-GRAZING HAS DECREASED THE CARRYING CAPACITY OF THE LAND RESULTING IN AN ECONOMIC LOSS. THE FAULTY USE OF FARMING TECHNIQUES HAS ALSO RESULTED IN A DETERIORATION OF SOIL DUE TO EROSION CAUSED BY THE REMOVAL OF THE NATURAL VEGETATION. IF THE ORIGINAL VEGETAL COVER COULD BE REESTABLISHED--AND THIS MAY BE IMPOSSIBLE ON CERTAIN SOILS--BOTH THE PRODUCTIVITY AND THE CLIMATE COULD BE BROUGHT BACK TO NORMAL.

OALS/DESICCATION/DESERTIFICATION/KARROO/SOUTH AFRICA/GRASSES/ PRECIPITATION DEFICIT/SOIL EROSION/GROUND COVER/SOIL MANAGEMENT/ VEGETATION CHANGE/CLIMATIC CHANGE /CLIMATIC-VEGETAL RELATIONSHIPS/ GRAZING/LAND MANAGEMENT/VEGETATION ESTABLISHMENT/DEGENERATION/ PERTURBATION

122

KONOBEEVA, M.G.

1968

EVOLUTION OF SOILS IN THE ANCIENT OASES OF THE DESERT ZONE. IN V.A. KOVDA AND E.V. LOBOVA, EDS., GEOGRAPHY AND CLASSIFICATION OF SOILS OF ASIA, P. 124-131.

ISRAEL PROGRAM FOR SCIENTIFIC TRANSLATIONS, JERUSALEM. 267 P. AVAILABLE NTIS AS TT-68-50439. GA 70-9:1700.

THE SOILS AND VEGETATION OF THE ALLUVIAL PLAINS OF SOVIET CENTRAL ASIA ARE THE RESULT OF BOTH THE PAST HISTORY OF IRRIGATION, AND CURRENT HUMAN ACTIVITIES. PLANT SUCCESSION WAS STUDIED ON ABANDONED IRRIGATED LAND TO ESTABLISH THE SEQUENCE OF CHANGES. THE SOILS CHANGE TO TAKYR SOILS OVER TIME, ALTHOUGH A COMPLICATION IS CAUSED BY DEFLATION.

OALS/OASES/MIDDLE ASIA/VEGETATION CHANGE/PERTURBATION/TAKYRS/SOIL FORMATION

123

KRAMER, H.P.

1951

CLIMATOLOGY OF THE MIDDLE EAST AND CENTRAL ASIA. A SELECTED, ANNOTATED BIBLIOGRAPHY.

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY 2(6):453-480.

A CHRONOLOGICAL (1861-1951) BIBLIOGRAPHY COVERING THE CLIMATOLOGY OF THE GENERAL GEOGRAPHICAL REGION, SPECIFIC GEOGRAPHICAL AREAS, AND THE

SEA AND OCEAN REGIONS BORDERING THESE PARTICULAR LANDS. AN OUTLINE OF CONTENTS PLUS AUTHOR AND SUBJECT INDEXES SERVE TO IDENTIFY CITATIONS.

TURKESTAN DESERT/WEATHER DATA/OALS/CLIMATOLOGY/GEOGRAPHY/DESERTS/ PERSIAN GULF/ARABIAN PENINSULA/MIDDLE EAST/MIDDLE ASIA /CASPIAN SEA/ AFGHANISTAN/BALUCHISTAN/IRAN/IRAQ /USSR/MESOPOTAMIAN PLAIN /EUPHRATES RIVER/SYRIA/BIBLIOGRAPHIES/AGRICULTURAL CLIMATOLOGY/CLIMATIC CHANGE/ ATMOSPHERIC CIRCULATION/RAINFALL/ANTICYCLONES /BIOCLIMATOLOGY/ RADIATION/SOLAR RADIATION/TEMPERATURE RANGES/WIND(METEOROLOGY)

124

KRISHNAMURTHY, K.V.

1952

THE CREEP OF THE DESERT. IN SYMPOSIUM ON THE RAJPUTANA DESERT, PROCEEDINGS.

NATIONAL INSTITUTE OF SCIENCES, INDIA, BULLETIN 1:131-136.

THE AUTHOR REVIEWS THE LITERATURE PERTINENT TO THE THEORY THAT THE DESERT IS EXPANDING. OPINIONS VARY ON THE ADVANCEMENT OF THE DESERT, SINCE LITTLE QUANTITATIVE DATA ARE AVAILABLE. METEOROLOGICAL DATA INDICATE THAT ANY EXTENSION OF DESERT CONDITIONS DURING THE LAST 70 OR 80 YEARS HAS NOT BEEN DUE TO THE DETERIORATION OF CLIMATE BUT DUE TO HUMAN OR OTHER CAUSES. OLDHAM S ANALYSIS OF HINDU SCRIPTURES, MYTHOLOGY, AND HISTORY, LEADS TO CONCLUSIONS, CONFIRMED BY STEIN, THAT THE DRYING UP OF THE KAHRA AND SARASWATI RIVERS RESULTED FROM CHANGES IN THE COURSE OF THE RIVER SUTLEJ. THE DRYING UP OF THE RIVER WAS NOT DUE TO ANY POSSIBLE METEOROLOGICAL CHANGES AND IS NOT A RESULT OF THE ENCROACHMENT OF DESERT CONDITIONS, BUT RESULTS FROM GEOLOGIC CHANGES ALTERING ITS COURSE. DESERT CONDITIONS NOW EXISTING ARE VERY NEARLY THE SAME AS THOSE THAT EXISTED OVER THREE TO FOUR THOUSAND YEARS AGO, AND THE RATE OF ADVANCE USUALLY GIVEN, HALF A MILE A YEAR, SEEMS TO BE HIGHLY EXAGGERATED. IN VIEW OF AFFORESTATION PROGRAMS BY OFFICIAL AND NON-OFFICIAL ORGANIZATIONS AIMED AT LIMITING EXPANSION OF THE DESERT IN THE NORTH AND NORTHEAST, THE AUTHOR CALLS FOR A SCIENTIFIC UNBIASED, AND OBJECTIVE INVESTIGATION AS TO WHETHER THE DESERT IS REALLY ADVANCING, AND IF SO, AT WHAT RATE.

DESERTIFICATION/OALS/AFFORESTATION/RAJASTHAN/INDIA/PERTURBATION/ CLIMATIC GEOMORPHOLOGY/CLIMATIC DATA/CLIMATIC CHANGE

125

KRUSEMAN, G.P.

1968

TOWARD A GARDEN OR TOWARDS A DESERT.

INTERNATIONAL INSTITUTE FOR LAND RECLAMATION AND IMPROVEMENT, WAGENINGEN, ANNUAL REPORT, P. 12-16. GA 708 504.

WITH A VIEW TO THE FUTURE USE OF LAND AND WATER, EXPERTS SHOULD AIM AT THE CORRECTION OF PAST MISTAKES AND THE PREVENTION OF FUTURE ERRORS

SUCH AS SALINIZATION, EROSION, WATERLOGGING AND OVERGRAZING. CONSERVATION OF LAND AND WATER MAY VERY WELL INCLUDE THE CONCENTRATION OF AGRICULTURE IN THOSE AREAS THAT ARE HIGHLY SUITED TO IT. MARGINAL AGRICULTURAL LANDS SHOULD THEN FIND THEIR DESTINY AS DWELLING AREAS, RECREATIONAL PARKS, INDUSTRIAL CENTERS, OR NATURE RESERVES. IT IS EXPECTED THAT A WISE MANAGEMENT OF LAND AND WATER WILL CONTRIBUTE POSITIVELY TO A RATIONAL USE AND CONSERVATION OF THE RESOURCES OF THE BIOSPHERE. SKILLFUL MANAGEMENT OF THE BIOSPHERIC RESOURCES IS A MATTER OF LIFE OR DEATH; IT WILL DETERMINE WHETHER OUR CHILDREN LIVE IN A GARDEN OR DIE IN A DESERT. (AUTHOR)

OALS/ECOSYSTEMS/HUMAN BEHAVIOR/SETTLEMENTS/REFORESTATION/CHEMICAL CONTROLS/LAND MANAGEMENT/NATURAL RESOURCES/DESERTIFICATION

126

KURKOV, A.A.

1967

SUSHCHESTVUET LI PROBLEMA USYKHANIIA AZII (IS THERE A PROBLEM OF DESICCATION OF ASIA).

AKADEMIIA NAUK SSSR, IZVESTIIA, SER. GEOGRAFICHESKAYA 4:152-155. (FULL TRANSLATION IN /SOVIET GEOGRAPHY: REVIEW AND TRANSLATION 9(1):47-54, 1968.) MGA 19.5-348; MGA 19.7-452.

ON THE BASIS OF AN EXTENSIVE REVIEW OF THE LITERATURE THE AUTHOR EXAMINES THE PROBLEM OF THE DESICCATION OF THE DESERTS OF ASIA IN HISTORICAL TIMES. THE DISCUSSION INCLUDES THE HYPOTHESIS AND EVIDENCE FOR CLIMATIC FLUCTUATION AND PROGRESSIVE ARIDIZATION OF CLIMATE, RETREAT OF THE GLACIERS, INTENSIFICATION OF THE PROCESS OF SAND BLOWING, PROGRESSIVE REDUCTION IN THE AREAS OF LAKES, SALINIFICATION OF SOILS, AND NATURE OF HUMAN ECONOMIC ACTIVITY IN DESERT REGIONS. THE AUTHOR CONCLUDES THAT IT IS IMPROPER TO REGARD THE PROCESSES OF DESICCATION OF THE TERRITORY OF THE ASIATIC DESERTS APART FROM CLIMATIC VARIATION.

CENTRAL ASIA/DESERTS/MOISTURE DEFICIT/DESICCATION/DESERTIFICATION/ OALS

127

LEHOUEROU, H.N.

1968

LA DESERTISATION DU SAHARA SEPTENTRIONAL ET DES STEPPES LIMITROPHES (LIBYE, TUNISIE, ALGERIE).

INTERNATIONAL BIOLOGICAL PROGRAM, SECTION C.T., COLLOQUE HAMMAMET, TUNISIA, 1965. LONDON.

THE SAHARA IS NOW GAINING AN AVERAGE OF SEVERAL HUNDRED MILLION HECTARES IN NORTH AFRICA. THIS DESERTIFICATION RESULTS FROM OVER-GRAZING, THE EXTENSION OF MARGINAL CEREAL CULTIVATION, AND

ELIMINATION OF WOODY SPECIES, ALL AS A CONSEQUENCE OF ACCELERATED DEMOGRAPHIC PRESSURES.

OALS/NORTH AFRICA/GRAZING/ARID LANDS/AGRONOMY/VEGETATION CHANGE/ ENVIRONMENTAL EFFECTS/DESERTIFICATION/SAHARA/LIBYA/TUNISIA/ALGERIA/ STEPPE

128

LEHOUEROU, H.N.

1969

LA VEGETATION DE LA TUNISIE STEPPIQUE (AVEC REFERENCES AU MAROC, A L ALGERIE ET A LA LIBYE)

INSTITUT NATIONAL DE LA RECHERCHE AGRONOMIQUE DE TUNISIE, ANNALES 42(5). 617 P., PLUS ANNEXE 4: CARTE PHYTO-ECOLOGIQUE DE LA TUNISIE CENTRAL ET MERIDIONALE TABLEAUX HORS-TEXTE.

THE PRINCIPAL ENVIRONMENTAL FACTORS (CLIMATE, GEOLOGY, SOIL, RUN-OFF, EROSION, HUMAN ACTIVITIES) AND THEIR RELATIONSHIPS WITH PLANT COVER ARE SET OUT. 34 NEW PLANT ASSOCIATIONS ARE DESCRIBED FOR CENTRAL TUNISIA, IN ADDITION TO THE 41 ASSOCIATIONS DESCRIBED IN THE AUTHOR S PUBLICATION OF 1959 ON SOUTHERN TUNISIA. INCLUDES AN ANALYTIC INVENTORY AND A MAP ON A SCALE OF 1:500,000 OF THE STEPPE VEGETATION. MUCH ATTENTION IS GIVEN TO THE DESERTIFICATION OF SEVERAL TENS OF THOUSANDS OF HECTARES ANNUALLY AS A RESULT OF CASUAL CROP-GROWING, OVERGRAZING, AND UPROOTING OF WOODY SPECIES. PRODUCTIVITY APPEARS TO BE DECREASING RAPIDLY BECAUSE OF IRRATIONAL AND OUTMODED USE OF RESOURCES OF THE BIOSPHERE. ENGLISH, GERMAN AND RUSSIAN SUMMARIES. (OALS)

TUNISIA/ALGERIA/LIBYA/VEGETATION/STEPPE/VEGETATION MAPS/PLANT COVER/ DESERTIFICATION/ENVIRONMENTAL EFFECTS/PRODUCTIVITY/GRAZING/PLANT POPULATIONS/OALS

129

LEHOUEROU, H.N.

1970

NORTH AFRICA, PAST, PRESENT, FUTURE. IN H.E. DREGNE, ED., ARID LANDS IN A CHANGING WORLD.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, PUBLICATION 90:227-278. SWRA W71-08457.

THE 4 COUNTRIES OF NORTH AFRICA (MOROCCO, ALGERIA, TUNISIA AND LIBYA) SHARE A COMMON HISTORY AND MANY SIMILARITIES IN BOTH NATURAL CONDITIONS AND HUMAN POPULATIONS. THE VARIOUS CLIMATES, SOILS, PHYSIOGRAPHIES, VEGETATION AND WATER RESOURCES OF THE AREA ARE DESCRIBED IN DETAIL AND BIOCLIMATOLOGICAL MAPS ARE PRESENTED. FOR OVER 12 CENTURIES, THE HISTORY OF THESE REGIONS HAS BEEN CHARACTERIZED BY ENDLESS WARFARE BETWEEN NOMADIC AND SEDENTARY POPULATIONS, WHICH TOGETHER WITH FAMINES AND EPIDEMICS, ESTABLISHED AN EQUILIBRIUM BETWEEN AGRICULTURAL PRODUCTIVITY AND HUMAN POPULATION. THE COLONIAL CONQUESTS OF THE 19TH AND 20TH CENTURIES BROKE THIS EQUILIBRIUM BY

ESTABLISHING PEACE AND INTRODUCING MODERN HYGIENE AND MEDICINE. THE RESULTING POPULATION PRESSURES HAVE INTENSIFIED FOREST DEGRADATION, WATER RESOURCES EXPLOITATION AND SOIL EROSION. DESERTIFICATION, BECAUSE OF POPULATION PRESSURES AND BAD AGRICULTURAL PRACTICES, PROCEEDS AT THE RATE OF 100,000 HA/YR. SOME SOIL AND WATER CONSERVATION METHODS ARE SUGGESTED. (OALS)

OALS/ALGERIA/MOROCCO/TUNISIA/LIBYA/SOCIAL ASPECTS/BIOCLIMATOLOGY/ REGIONAL ANALYSIS/DESERTIFICATION/LAND USE/NOMADS/SETTLEMENTS/WATER RESOURCES

130

LEIBUNDGUT, H.

1955

LES PROBLEMES SYLVICOLES DU REBOISEMENT EN REGIONS ARIDES (SILVICULTURAL PROBLEMS OF REFORESTATION IN ARID REGIONS).

SCHWEIZERISCHE ZEITSCHRIFT FUER FORSTWESEN 106(6/7):356-366.

SOIL MOISTURE SUPPLY IS OF PRIMARY IMPORTANCE IN REFORESTATION OF ARID REGIONS. IF SOIL MOISTURE FALLS TO OR BELOW THE WILTING POINT, THE ALKALINITY, IN MANY INSTANCES, IS TOXIC TO PLANTS, ESPECIALLY ON FLAT GROUND. NATURAL VEGETATION IS ALSO DESTROYED BY GRAZING, FIRE, OR EXCESSIVE CUTTING, ACCOMPANIED BY SEVERE EROSION. REFORESTATION WILL SUCCEED ONLY ON SITES THAT ARE NATURALLY CAPABLE OF SUPPORTING FORESTS, I.E., WHERE THE FINAL STAGE OF NATURAL SUCCESSION IS FOREST. PLANTATIONS SHOULD BE WIDELY SPACED TO AVOID ROOT COMPETITION AND TO PERMIT MOST OF THE PRECIPITATION TO REACH THE SOIL. PLANTINGS SHOULD CONSIST OF NATIVE TREES AND THOSE OF ECONOMIC VALUE (CYPRESS, PINES, CEDAR) INSTEAD OF EXOTICS. REFORESTATION SHOULD BE CARRIED OUT IN STAGES, BEGINNING WITH THE MOST FAVORABLE AREAS, AND THEN EXPANDING TO COVER THE ENTIRE AREA.

OALS/SOIL MOISTURE/REFORESTATION/ARID CLIMATE/ALKALINITY/TOXICITY/ DESICCATION/EROSION/TREES/SITES/LIMITING FACTORS/ROW SPACING/TANGIBLE BENEFITS

131

LEOPOLD, A.

1924

GRASS, BRUSH, TIMBER AND FIRE IN SOUTHERN ARIZONA.

JOURNAL OF FORESTRY 22:1-10.

BRUSH ENCROACHMENT HAS BECOME A SERIOUS PROBLEM IN SOUTHERN ARIZONA. THE PREDOMINANT INVADING BRUSH SPECIES ARE: OAK, MANZANITA, MOUNTAIN MAHOGANY, AND CEANOTHUS. SOME VERY CONSPICUOUS FACTORS ARE: 1) WIDESPREAD ABNORMAL EROSION; 2) UNIVERSAL FIRE SCARS ON ALL OF THE OLDER JUNIPERS, OAKS, AND OTHER TREES; 3) OLD JUNIPER STUMPS LEVELLED TO THE GROUND BY FIRE; 4) MUCH JUNIPER REPRODUCTION MERGING TO PINE REPRODUCTION IN THE UPPER LIMITS OF THIS TYPE; 5) GREAT THRIFT AND SIZE IN THE JUNIPERS AND OTHER SPECIES THAT HAVE SURVIVED FIRE.

CLOSER EXAMINATION REVEALS ADDITIONAL FACTS, ALL DATING BACK APPROXIMATELY 40 YEARS, AND POINTING TO CHANGED CONDITIONS SINCE THEN. THIS CORRESPONDS WITH SETTLEMENT BY WHITE MAN, FIRE SUPPRESSION AND OVERGRAZING. THE CLIMAX WAS ORIGINALLY WOODLAND, BUT WAS HELD IN CHECK BY GRASS COMPETITION AND FIRES. GRAZING RESULTED IN THE REMOVAL OF GRASSES, THUS ALTERING THE GRASS-ROOT COMPETITION WITH WOODY SPECIES AND SUPPRESSING FIRES (DUE TO LESS GRASS FUEL). THE SUBSTITUTION OF GRAZING FOR FIRE HAS RESULTED IN A TRANSITION TO THIN GRASS AND THICK BRUSH, CONDITIONS THAT FAVOR SUCCESSION TOWARD A WOODLAND CLIMAX. (OALS)

OALS/WGM/NPS-ONS/ARIZONA/GRASSLAND BIOME/DESERT GRASSLAND/VEGETATION CHANGE/CLIMAX/SUCCESSION/BURNING/GRAZING/PERTURBATION/GRASSES/VEGETAL RELATIONSHIPS/PLANT COMMUNITIES/PLANT ECOLOGY/CEANOTHUS/QUERCUS/ ARCTOSTAPHYLOS/CERCOCARPUS/JUNIPERUS/SHERVE

132

LIAO, Y.P.

1964

LE CONTROLE DES DESERTS EN CHINE (THE CONTROL OF DESERTS IN CHINA).

ACTA GEOGRAPHICA (PARIS) 51:18-20.

DESERTS OCCUPY 11 PERCENT OF THE SURFACE AREA OF CHINA. THIS PAPER BRIEFLY DESCRIBES AFFORESTATION PROGRAMS TO BUILD GREEN BELTS ACROSS UNPROTECTED AREAS AND BRING THEM INTO PRODUCTION.

OALS/ASIA/REFORESTATION/VEGETATION ESTABLISHMENT/DESERTIFICATION/ CHINA

133

LOVE, R.M.

1970

THE RANGELANDS OF THE WESTERN U.S.

SCIENTIFIC AMERICAN 222(2):88-96. GA 71C-1155. SWRA W70-04907.

CATTLE GRAZING IS THE PRIMARY USE OF THE RANGELANDS IN THE WESTERN UNITED STATES. THE WESTERN RANGES FALL INTO THREE DISTINCT CATEGORIES: NORTHERN ROCKY MOUNTAIN, INTERMOUNTAIN, AND SOUTHWEST. TRUE GRASSLAND IS RARE IN THE SOUTHWEST. INSTEAD, DESERTS AND SEMI-DESERTS PREDOMINATE. VEGETATION MANAGEMENT IS THE MAJOR PROBLEM IN IMPROVING THE RANGELANDS. BRUSH CONVERSION PROGRAMS HAVE SHOWN SUBSTANTIAL INCREASES IN WATER YIELD IN THE TREATED AREAS. THIS IS DUE TO THE FACT THAT AN ACRE OF BRUSH USES SIX MORE ACRE-INCHES OF WATER THAN DOES HERBACEOUS VEGETATION. WITH PROPER MANAGEMENT OF BRUSH IN THE WATERSHEDS OF THE WEST, THE LAND CAN PROVIDE MORE MEAT AND LUMBER, SUFFER LESS FROM EROSION AND FLOOD, AND BE MORE USABLE FOR RECREATION. THE RAPIDLY GROWING NEED FOR MORE RECREATIONAL LAND IS CAUSING CONFLICTS WITH OTHER LAND USES. THE ADVANTAGES OF BRUSH

CONTROL AND THE USE OF CONTROLLED FIRES, TRANSHUMANCE, CANOPY ARCHITECTURE, LEAF-AREA INDEX, AND EXOTIC GRASSES ARE OTHER TOPICS DISCUSSED. (OALS)

VEGETATION/DESERTS/OALS/RANGES/SOUTHWEST U.S./ROCKY MOUNTAIN REGION/ WEST U.S./CATTLE/GRAZING/RANGE GRASSES/SEMIARID CLIMATE/RANGE MANAGEMENT/BRUSH CONTROL/CONVERSION(MANAGEMENT) /WATER YIELD IMPROVEMENT/REVEGETATION/DESERT PLANTS/WATER CONSERVATION/LAND USE/ MULTIPLE PURPOSE/RECREATION/CONTROLLED BURNING/WATERSHED MANAGEMENT/ TRANSHUMANCE/CANOPY /INTERCEPTION/LEAVES/INTRODUCED SPECIES/GRASSES

134

LOWDERMILK, W.C.

1935

MAN MADE DESERTS.

PACIFIC AFFAIRS 8(4):409-419.

THE AUTHOR INTERPRETS THE FALL OF ANCIENT CIVILIZATIONS IN ARID AND SEMI-ARID AREAS AS BEING DUE TO LAND ABUSE AND RESULTING EROSION AND SOIL DETERIORATION. EXAMPLES ARE NOTED FROM NORTHWEST CHINA, SAHARA, PERUVIAN COAST, MAYAN CIVILIZATION IN MEXICO, ETC. THE HISTORY OF AGRICULTURAL EXPLOITATION IN THE UNITED STATES, CULMINATING IN THE GREAT DUST BOWLS, IS TRACED. THE AUTHOR CONCLUDES THAT IT IS CLEAR THAT MAN AND HIS ANIMALS MAY EXTEND DESERT CONDITIONS, BY PROCESSES OF MAN-INDUCED DESICCATION INTO REGIONS FORMERLY CAPABLE OF SUPPORTING LARGE POPULATIONS. CLIMATE DOES CHANGE, BUT NOT AT THE COMPARATIVELY RAPID RATE OF THE DEGENERATION OF VAST AREAS OF HABITABLE REGIONS.

OALS/DESERTS/ARID LANDS/HISTORY/SOIL EROSION/DUST STORMS/SOCIAL ASPECTS/GRAZING/VEGETATION/VEGETATION EFFECTS/ARCHAEOLOGY/DEGENERATION /ANIMAL DAMAGE/PERTURBATION/DESERTIFICATION/DESICCATION

135

LOWDERMILK, W.C.

1960

THE RECLAMATION OF A MAN-MADE DESERT. IN MAN AND THE ECOSPHERE (READINGS FROM SCIENTIFIC AMERICAN), P. 219-227.

W.H. FREEMAN AND COMPANY, SAN FRANSISCO.

IN THE 1950 S, ISRAEL UNDERTOOK TO CREATE A NEW AGRICULTURE IN AN OLD AND DAMAGED LAND. TEN YEARS LATER IT SUCCEEDED IN BEING AN EXPORTER OF AGRICULTURAL PRODUCE AND NEARLY ACHIEVED THE GOAL OF AGRICULTURAL SELF-SUFFICIENCY. POLITICAL BOUNDARIES AND CONFLICTS HAVE FRUSTRATED PROGRAMS TO REALIZE THE FULL BENEFITS OF THE WATER SUPPLY TO ALL CONCERNED IN A REGION WHERE WATER IS SCARCE. VARIATIONS IN RAINFALL AS WELL AS EXTREME TEMPERATURE RANGES AFFECT VEGETATION AS DOES THE KHAMSIN WHICH MAY BLOW FOR DAYS TO THE EAST AFFECTING UNPROTECTED CROPS. HOWEVER, THE AUTHOR SAYS THERE HAS BEEN NO SIGNIFICANT DETERIORATION IN CLIMATE SINCE ROMAN TIMES. THE DESERT THAT ENCROACHED THE ONCE-FLOURISHING LAND WAS THE WORK OF MAN, NOT OF NATURE. THE AUTHOR OUTLINES STEPS THAT HAVE BEEN TAKEN TO RECLAIM

ERODED LAND BY IMPLEMENTING TECHNIQUES SUCH AS CONTOUR FARMING, IRRIGATION PRACTICES, AND SOIL CONSERVATION METHODS.

OALS/ISRAEL/RECLAMATION/DESERTIFICATION/SOIL CONSERVATION/LAND RECLAMATION/IRRIGATION PRACTICES/VEGETATION ESTABLISHMENT/WIND ACTION/ TEMPERATURE RANGES/REGENERATION(VEGETATION)

136

MABBUTT, J.A.

1967

DENUDATION CHRONOLOGY IN CENTRAL AUSTRALIA: STRUCTURE, CLIMATE, AND LANDFORM INHERITANCE IN THE ALICE SPRINGS AREA. IN J.N. JENNINGS AND J.A. MABBUTT, EDS., LANDFORM STUDIES FROM AUSTRALIA AND NEW GUINEA, P. 144-181.

CAMBRIDGE UNIVERSITY PRESS, CAMBRIDGE. MGA 20.7-461. GA 68A-145. BIGENA (32)E68-04500.

THIS ACCOUNT OF THE ALICE SPRINGS AREA OF SOME 375,000 SQUARE KILOMETERS DEALS WITH THE PROBLEM OF INTERPRETING LANDFORMS ONLY IN TERMS OF THE PREVAILING CLIMATE AND THE SINGLE RESULTANT MORPHOGENESIS. ITS THEME IS THAT THE ARID LANDSCAPE HAS A COMPLEX INHERITANCE AND THAT IT MUST BE UNDERSTOOD IN TERMS OF A LONG HISTORY OF CHANGING CLIMATE. THE AREA IS DIVIDED INTO 3 PARTS: THE CENTRAL RANGES BORDERED BY THE NORTHERN PLAINS AND UPLANDS, AND THE SOUTHERN DESERT BASINS AND PIEDMONT PLAINS. CHARACTERISTICS AND DEVELOPMENTAL HISTORY OF THESE DIVISIONS, PLUS FORMATION OF DUNE FIELDS AND SAND PLAINS OF NEARLY 200,000 SQUARE KILOMETERS, ARE EXAMINED IN DETAIL. THE AREA DEMONSTRATES A GENERAL PRINCIPLE THAT DESERTS ARE REGIONS OF CONSERVATION RATHER THAN DESTRUCTION OF LANDFORMS.

OALS/ALICE SPRINGS/AUSTRALIAN DESERTS/CLIMATIC CHANGE/DENUDATION/ DENUDATION CHRONOLOGY/LANDFORMS/SAND DESERTS/DUNES/PLAINS/RELICT LANDFORMS

137

MABBUTT, J.A.

1969

PROBLEMS IN THE CLIMATIC GEOMORPHOLOGY OF ARID LANDS.

ANNALS OF ARID ZONE 8(2):209-224. SWRA W71-00700.

TWO MAJOR PROBLEMS OF DESERT STUDIES ARE: (1) THE NATURE OF THE DEVELOPMENTAL PROCESSES OF ARID ZONE LANDFORMS; (2) DEFINITIVE DESCRIPTIONS OF ARID AND SEMIARID REGIONS. EARLY INVESTIGATORS FELT THAT DESERTS WERE STATIC REGIONS CONSISTING OF RELICT TOPOGRAPHICAL FORMS. GRADUALLY, THE IMPORTANCE OF WIND AND WATER, PRIMARILY AS WEATHERING AGENTS, HAS COME TO BE RECOGNIZED. IT IS THE AUTHOR S VIEW THAT THE PHYSIOCHEMICAL EFFECTS OF WATER ARE AT LEAST AS IMPORTANT AS THE PHYSICAL EFFECTS, AND THAT WIND AND WATER ARE COMPLEX INTERACTING AGENTS WHOSE EFFECTS DECREASE TOWARD THE ARID CORE AREAS. A NUMBER OF CHARACTERISTIC LANDFORM PHENOMENA ARE DESCRIBED, BUT THEIR USEFULNESS AS ARID ZONE MORPHOCLIMATIC INDICES HAS BEEN LIMITED. ADDITIONALLY, VEGETATION, RAINFALL AND THE PRESENCE OF SAND DUNES ARE EXAMININED IN

TERMS OF THE DELIMITATIONS AND SUBDIVISIONS OF ARID REGIONS, BUT NONE ARE TRULY DEFINITIVE. THIS ARGUMENT IS BUTTRESSED BY DESCRIPTIONS OF A WIDE VARIETY OF WARM ARID CLIMATES, MANY OF WHICH DIFFER GREATLY IN CRUCIAL DESCRIPTIVE PARAMETERS. THERE ARE SHORT DISCUSSIONS OF PAST CLIMATIC CHANGES AS REVEALED BY PALEOFORMS AND THE INFLUENCES OF ANTHROPOGENIC FACTORS. (OALS)

OALS/WEATHERING/ARID LANDS/CLIMATIC ZONES/SEMIARID CLIMATE/SANDS/ RAINFALL/GEOLOGY/EOLIAN SOILS/WIND EROSION/PALEOCLIMATOLOGY/DESERTS/ DUNES /CLIMATIC GEOMORPHOLOGY/LANDFORMS/CLIMATIC CHANGE

138

MACDOUGAL, D.T.

1908

THE COURSE OF THE VEGETATIVE SEASONS IN SOUTHERN ARIZONA.

PLANT WORLD 11(9,10,11, AND 12):189-201,217-231,237-249,261-270.

A TREATISE ON THE CLIMATE AND VEGETATION OF THE SONORAN DESERT. DATA IS PRESENTED FROM THE DESERT LABORATORY ON TUMAMOC HILL. CITES THE PROGRESSIVE ARIDITY OF THE SONORAN DESERT SINCE PLEISTOCENE TIMES AS RESULTING IN THE RECENT EVOLUTION OF XEROPHILOUS PLANT FORMS. THE MAJOR PORTION OF THE ARTICLE IS A DISCUSSION OF PLANT SPECIES IN RELATION TO, AND MOST CHARACTERISTIC OF, EACH SEASON. THE SEASONS ARE PROPOSED AS FOLLOWS: (1) WINTER WET SEASON - DECEMBER, JANUARY, FEBRUARY AND MARCH, WITH NOTES ON WINTER PERENNIALS AND WINTER ANNUALS; (2) ARID FORE-SUMMER - APRIL, MAY AND JUNE, WITH NOTES MAINLY ON THE CACTI AND FLOWERING PHENOLOGY OF THE CACTI; (3) HUMID MID-SUMMER - JULY, AND AUGUST, WITH NOTES ON SUMMER PERENNIALS AND SUMMER ANNUALS; (4) DRY AFTER-SUMMER - SEPTEMBER, OCTOBER AND NOVEMBER, AN ALMOST TOTAL CESSATION OF VEGETATIVE ACTIVITY, EXCEPT FOR THE RIPENING OF SEEDS AND CURING OF GRASSES.

OALS/WGM/NPS-ONS/TUMAMOC HILL/SONORAN DESERT/CLIMATIC-VEGETAL RELATIONSHIPS/CLIMATIC CHANGE/XEROPHYTES/DESERT PLANTS/PLANT ECOLOGY/ SEASONAL/ADAPTATION/WINTER PRECIPITATION/SUMMER PRECIPITATION/ANNUALS/ PERENNIALS/EPHEMERALS/CACTACEAE/PHENOLOGY/FLOWERING/SUMMER EPHEMERALS/ WINTER EPHEMERALS/DESERT BIOME

139

MAHGOUB, S.M.

1967

LAND POLICY AND SETTLEMENT IN SUDAN. IN M.R. EL GHONEMY, ED., LAND POLICY IN THE NEAR EAST, P. 175-188.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME. WAERSA (10)831.

NOMADISM AS A WAY OF LIFE IN SUDAN IS NOW REGARDED AS A SOCIOLOGICAL PROBLEM AND A HANDICAP TO NATIONAL DEVELOPMENT. THE GOVERNMENT IS CONCERNED WITH THE SETTLEMENT OF THE 20 PERCENT OF THE POPULATION NOMADIC OR SEMI-NOMADIC, AND HAS ENLISTED THE AID OF THE U.N. SPECIAL

FUND TO EXECUTE TEN PILOT PROJECTS FOR SETTLEMENT, EACH WITH SUPPORTING SERVICES INTENDED TO PROVIDE AN IMPROVED STANDARD OF LIVING AND FEWER HARDSHIPS. (OALS)

OALS/SUDAN/NOMADS/ECONOMIC DEVELOPMENT/SOCIAL ASPECTS/POLITICAL ASPECTS/SETTLEMENTS

140

MALDE, H.E.

1964

ENVIRONMENT AND MAN IN ARID AMERICA.

SCIENCE 145:123-129.

THE AUTHOR BELIEVES THAT MODERN MAN MIGHT BRING HIS SURROUNDINGS UNDER BETTER CONTROL IF HE ADOPTED EARLY MAN S RESPONSE TO HIS ENVIRONMENT AND ATTEMPTED TO IDENTIFY AND UNDERSTAND PAST CHANGES IN THE LANDSCAPE. HE POSES THE FOLLOWING QUESTIONS: DID EARLY HUNTERS EXTERMINATE PLEISTOCENE ANIMALS, OR DID THEY DISAPPEAR BECAUSE OF AN ELUSIVE BIOLOGIC CAUSE. WAS MAN DRIVEN OUT OF SOME AREAS BY DROUGHT DURING ALTITHERMAL TIME, OR ARE THE PREVAILING CONCEPTS OF ALTITHERMAL ARIDITY ERRONEOUS. DO ANOMALOUS DISTRIBUTIONS OF PLANTS AND ANIMALS MAP RECENT CHANGES IN CLIMATIC PATTERNS. IS LIFE MORE TOLERANT OF EXTREMES THAN UNIFORMITARIAN IDEAS ASSUME. FROM GEOLOGIC STUDY OF FORMER EPISODES OF ALLUVIATION, CAN MAN LEARN TO MAKE DESERT STREAMS RUN AGAIN IN GRASSY FLOOD PLAINS, OR IS THE CLIMATE NOW TOO GREAT A HINDRANCE. HIS CONCLUSION IS THAT GEOLOGIC, BIOLOGIC, AND ARCHEOLOGIC CLUES SUGGEST CLIMATIC CHANGES IN THE DRY AMERICAN SOUTHWEST IN THE LAST 15,000 YEARS, AND THAT MODERN MAN HAS MUCH TO LEARN FROM AN EXAMINATION OF THIS EVIDENCE TO HELP HIM CURRENTLY. (OALS)

OALS/SOUTHWEST U.S./BIOGEOGRAPHY/CLIMATIC CHANGE/ARCHAEOLOGY/ ENVIRONMENT/HISTORY/LIMITING FACTORS/GEOCHRONOLOGY

141

MANSOUR, A.H.

1967

LES PROBLEMES PASTORAUX ET HUMAINS DANS LES ZONES ARIDES DU MOYEN-ORIENT (PASTORAL AND HUMAN PROBLEMS IN ARID ZONES OF THE MIDDLE EAST).

JOURNAL D AGRICULTURE TROPICALE ET DE BOTANIQUE APPLIQUEE 14(10-11):454-493. WAERSA (10)3048.

THE TRADITIONAL ANIMAL HUSBANDRY SYSTEM OF THE NOMADIC AND SEMI-NOMADIC HERDSMEN TRIBES IN THE ARID ZONES OF SAUDI ARABIA, YEMEN, EGYPT, JORDAN, SYRIA, IRAQ AND IRAN IS DESCRIBED. SUBJECTS DISCUSSED INCLUDE THE WAY OF LIFE OF THE BEDOUIN, HIS RELATIONS TO THE URBAN OWNERS OF HIS ANIMALS, TRANSHUMANCE FOR WINTER GRAZING IN THE PLAINS, PLANT SPECIES GRAZED OR BROWSED, NUMBERS AND BREEDS OF SHEEP, GOATS, CAMELS, HORSES AND DONKEYS, AND VARIOUS KINDS OF MILK PRODUCTS PREPARED IN THE AREA. IN THE LAST 15 YEARS AGRICULTURAL DEVELOPMENT

HAS INCREASINGLY RESTRICTED THE GRAZING AREAS, RESULTING IN SERIOUS OVER-GRAZING AND DEPLETION OF THE VEGETATION. MEASURES TO BE TAKEN BY GOVERNMENTS TO COUNTERACT THIS ARE PROPOSED.

YEMEN/OALS/MIDDLE EAST/NOMADS/GRAZING/PERTURBATION/LIVESTOCK/SOCIAL ASPECTS /SAUDI ARABIA/EGYPT/JORDAN/SYRIA/IRAQ/IRAN

142

MARTIN, P.S.

1963

THE LAST 10,000 YEARS: A FOSSIL POLLEN RECORD OF THE AMERICAN SOUTHWEST.

UNIVERSITY OF ARIZONA PRESS, TUCSON. 87 P.

GEOLOGIC CLIMATIC AND VEGETATION CHANGES ARE CONSIDERED IN THE LIGHT OF PAST EVIDENCE AND IN RELATION TO THE FOSSIL POLLEN RECORD DESCRIBED HEREIN. THE CLASSIC BRYAN-ANTEVS CLIMATIC MODEL, WHICH IS DEEPLY ENMESHED IN THE LITERATURE OF SOUTHWESTERN PREHISTORY AND PLEISTOCENE GEOLOGY, RELATED PREHISTORIC EROSION TO DROUGHT. MARTIN BELIEVES THE TREE RING DATA TO BE MISINTERPRETED AND THAT FOSSIL POLLEN AND THE BIOGEOGRAPHIC RECORD SUPPORT A MODEL IN WHICH POST GLACIAL EROSION IS ATTRIBUTABLE TO PERIODS OF INTENSE SUMMER RAINFALL. HE FINDS NO RELIABLE POLLEN EVIDENCE THAT POSTGLACIAL DROUGHTS, IF THEY OCCURRED, WERE SUFFICIENT TO SHIFT BIOTIC ZONES ABOVE THEIR PRESENT LEVEL. HE ATTRIBUTES THE EXTINCTIONS OF LARGE MAMMALS IN NORTH AMERICA 8,000 TO 10,000 YEARS AGO TO THE PREDATORY ACTIVITIES OF PALEO-INDIANS, RATHER THAN ANY CHANGES IN CLIMATE.

OALS/SOUTHWEST U.S./ARIZONA/NEW MEXICO/MEXICO/PALYNOLOGY/ PALEOCLIMATOLOGY/PLEISTOCENE EPOCH/VEGETATION/DROUGHTS/BIOGEOGRAPHY / DENDROCHRONOLOGY/CLIMATOLOGY/ARCHAEOLOGY /ARID LANDS/MAMMALS/SUMMER PRECIPITATION/EXTIRPATED SPECIES/CLIMATIC CHANGE/VEGETATION CHANGE/ INDIANS OF NORTH AMERICA

143

MARTIN, P.S.

1970

PLEISTOCENE NICHES FOR ALIEN ANIMALS.

BIOSCIENCE 20(4):218-221. SWRA W71-01402.

RECENT STUDIES IN A TYPICAL ARIZONA DESERT SHRUB COMMUNITY SHOWED THAT OF A PRODUCTIVITY OF 1400 KG/HA/YR, 900 KG/HA WERE INEDIBLE FOR CATTLE. FIVE TIMES AS MANY CATTLE WERE SUPPORTED ON AN ADJACENT GRASSLAND WITH ABOUT THE SAME PRECIPITATION, EVEN THOUGH THE PRODUCTIVITY OF THE DESERT SHRUB COMMUNITY WAS GREATER. CLEARLY THE COW, A GRASS-PREFERRING, WATER-DEPENDENT HERBIVORE IS ILL-ADAPTED TO WESTERN RANGES WHICH HAVE LITTLE OF EITHER. THE AUTHOR ARGUES FOR SELECTIVE, CAREFUL STUDIES ON THE INTRODUCTION OF AFRICAN HERBIVORES TO THESE ARID AREAS. IN ANSWER TO THE OBJECTION THAT THEY MAY WREAK ECOLOGICAL DESTRUCTION, OWING TO THEIR LACK OF ADAPTATION TO THESE AREAS, SEVERAL POINTS ARE MADE: 1) THE PAST BIOMASS OF THE SOUTHWEST WAS MUCH GREATER THAN IT IS NOW; 2) DURING THE PLEISTOCENE, A WAVE OF

EXTINCTIONS OCCURRED; 3) THESE EXTINCTIONS WERE MAINLY LARGE HERBIVORES CLOSELY RELATED OR IDENTICAL TO EXTANT AFRICAN HERBIVORES, 4) THE VACATED NICHES HAVE NEVER BEEN FILLED AND 5) INTRODUCTION OF AT LEAST SOME OF THESE ANIMALS INTO THE SOUTHWESTERN U.S. MAY VERY WELL BE INTO NICHES FOR WHICH THEY ARE PREADAPTED. A PLEA IS MADE FOR CONSERVATION OF POTENTIALLY USEFUL AFRICAN ANIMAL GENE BANKS. (OALS)

OALS/SOUTHWEST U.S./GRAZING/RANGE MANAGEMENT/INTRODUCED SPECIES/ EXTIRPATED SPECIES/PRODUCTIVITY/ADAPTATION/ARID LANDS/CATTLE/ XEROPHILES/DESERT ANIMALS/SHRUBS/ARIZONA/HERBIVORES/UNGULATA/HABITATS/ FORAGE PRODUCTION/BROWSE/PLEISTOCENE EPOCH

144

MARTIN, S.C.

1964

SOME FACTORS AFFECTING VEGETATION CHANGES ON A SEMIDESERT GRASS-SHRUB CATTLE RANGE IN ARIZONA.

UNIVERSITY OF ARIZONA (PH.D. DISSERTATION). 122 P.

A 5-YEAR GRAZING STUDY TESTING THE EFFECTS OF WINTER, SUMMER, AND YEAR-LONG GRAZING ON SEMIDESERT CATTLE RANGE WAS MADE IN SOUTHERN ARIZONA FROM 1957 TO 1961. SUPERIMPOSED ON THE GRAZING TREATMENTS WERE MEASUREMENTS OF THE EFFECTS OF DISTANCE FROM WATER, TEXTURE OF SUBSOIL, AND MESQUITE CONTROL. SPECIES OF GRASSES STUDIED WERE TRICHACHNE CALIFORNICA, ARISTIDA TERNIPES, A. HAMULOSA, A. GLABRATA, AND MUHLENBERGIA PORTERI. DATA ARE ALSO COMPILED IN GROUPS FOR ANNUAL GRASSES, ALL PERENNIAL GRASSES, AND TOTAL GRASSES. SHRUB SPECIES WERE PROSOPIS JULIFLORA VELUTINA, APLOPAPPUS TENUISECTUS, AND ALL SHRUBS COMBINED. (OALS)

MUHLENBERGIA PORTERI/OALS/WGM/NPS-ONS/ARIZONA/RANGES/RANGE MANAGEMENT/GRAZING /DESERT GRASSLAND/SHRUBS/SOIL TEXTURE/SUBSOIL/ BRUSH CONTROL/VEGETATION CHANGE/GRASSES/WATER SOURCES/TRICHACHNE CALIFORNICA/ARISTIDA/CATTLE/PROSOPIS JULIFLORA/APLOPAPPUS TENUISECTUS

145

MARTINSON, G.G.

1969

VSEGDA LI BEZVODNOI BYLA PUSTYNIA GOBI (HAS THE GOBI DESERT ALWAYS BEEN WATERLESS).

PRIRODA (MOSCOW) 10:84-88. MGA 21.10-454.

DURING 1946-1949 A LARGE PALEONTOLOGICAL EXPEDITION OF THE U.S.S.R. ACADEMY OF SCIENCE CONCLUDED FROM SAMPLE MATERIAL THAT SOUTHERN MONGOLIA WAS UNDER WATER IN THE PAST. SINCE THE PAST GEOGRAPHY OF SUCH A LARGE REGION COULD NOT BE RECONSTRUCTED WITHOUT COMBINED GEOLOGICAL AND PALEONTOLOGICAL INVESTIGATIONS AND STUDIES OF THE NUMEROUS WATER FAUNA, A COMBINED SOVIET-MONGOLIAN RESEARCH GEOLOGICAL EXPEDITION WAS ORGANIZED IN THE SUMMER OF 1967. THE AUTHOR, A MEMBER OF THE EXPEDITION, REPORTS ON THE FINDINGS THAT BROADENED NOTIONS ABOUT THE SIZE OF THE AREA THAT WAS UNDER WATER. EVIDENCE IS

PRESENTED IN SEVERAL ANNOTATED PHOTOGRAPHS INCLUDING ONE OF SHELLS AND ONE OF SCATTERED BONES OF A GIANT DINOSAUR. THE AUTHOR STATES THAT A BREAKING UP OF LARGE WATER SYSTEMS BEGAN AT THE END OF THE UPPER CHALK PERIOD. THE DRY LAND FAUNA THEN REPLACED THE WATER FAUNA AND REACHED ITS PEAK IN THE TERTIARY PERIOD; LAKES AND RIVERS OCCUPIED SMALLER AREAS AND SEEMINGLY SHIFTED TO MORE NORTHERLY REGIONS OF MONGOLIA.

OALS/MONGOLIA/PALEOCLIMATOLOGY/GOBI/DESERTIFICATION

146

MEHRHOFF, L.A., JR.

1955

VEGETATION CHANGES ON A SOUTHERN ARIZONA GRASSLAND RANGE, AN ANALYSIS OF CAUSES.

UNIVERSITY OF ARIZONA (M.S. THESIS). 48 P.

AN ATTEMPT WAS MADE TO EVALUATE AND EXAMINE THE MORE IMPORTANT CAUSES OF SHRUB INVASION ON THE SANTA RITA EXPERIMENTAL RANGE: GRAZING BY DOMESTIC LIVESTOCK AND OTHER ANIMALS, COMPETITION AND SELECTION, CLIMATIC CHANGES, AND FIRE. PRINCIPAL INVADERS WERE BURROWEED, MESQUITE, OPUNTIA SPINOSIOR, O. FULGIDA AND CREOSOTEBUSH. IT WAS CONCLUDED THAT THERE HAVE BEEN NO CHANGES IN CLIMATE THAT WOULD PERMIT INVASION BY SHRUBS; THAT GRAZING ANIMALS HAVE HAD AN ADVERSE EFFECT ON GRASSLAND VEGETATION BECAUSE OF LARGE HERD NUMBERS AND THEIR EFFECTS ON SOIL WITH THE REDUCTION OF LITTER AND DRY GRASSES WHICH FORMERLY CARRIED RANGE FIRES; THAT CATTLE AND RODENTS AFFECT THE RATE OF SHRUB INVASION THROUGH DISSEMINATION OF SEEDS AND VEGETATIVE JOINTS OF INVADING SPECIES; AND THAT SHRUB INVASION ON SOUTHERN ARIZONA SEMIDESERT GRASSLAND RANGE IS DUE PRIMARILY TO THE REDUCTION OF RANGE FIRES. AFTER LIVESTOCK INTRODUCTION, FIRES COULD NO LONGER REPEL THE INVADING SHRUBBY SPECIES BECAUSE OF THE LACK OF NECESSARY FUEL.

OALS/WGM/NPS-ONS/SWERVE/ARIZONA/DESERT GRASSLAND/GRASSLAND BIOME/ VEGETATION CHANGE/SANTA RITA EXPERIMENTAL RANGE/SHRUBS/GRAZING/BURNING /COMPETITION/CLIMATIC CHANGE/OPUNTIA/PROSOPIS JULIFLORA/LARREA DIVARICATA/APLOPAPPUS TENUISECTUS/PLANT INVADERS/PERTURBATION/ UNDESIRABLE PLANTS/RANGE MANAGEMENT/DESERT BIOME

147

MEHRINGER, P.J.

1967a

THE ENVIRONMENT OF EXTINCTION OF THE LATE-PLEISTOCENE MEGAFAUNA IN THE ARID SOUTHWESTERN UNITED STATES.

INQUA CONGRESS, 7TH, PROCEEDINGS 6:247-266. GA 698-614.

THE SAME TYPES OF HABITAT WIDESPREAD TODAY WERE OCCUPIED BY LATE-PLEISTOCENE MEGAFAUNA. IF CLIMATIC CHANGE IS TO BE CONSIDERED THE PRINCIPAL CAUSE OF EXTINCTION, THE EXTREME GLACIAL CLIMATES OF WISCONSIN AGE SHOULD HAVE EXERTED A DETRIMENTAL EFFECT. EXCLUDING NONCLIMATIC FACTORS, THE PERIOD OF RAPID DEGLACIATION SHOULD HAVE RESULTED IN THE EXPANSION AND NOT THE DEMISE OF THE MEGAFAUNA. AT

PRESENT THERE IS A GREATER AREA AND A WIDER VARIETY OF HABITATS FOR HERBIVORES THAN EXISTED DURING THE WISCONSIN ICE ADVANCES. LARGE HERBIVORE BIOMASS SHOULD HAVE INCREASED, NOT DECLINED, AS THE ICE RETREATED. BECAUSE DIFFERENT SPECIES OCCUPIED HABITATS RANGING FROM WARM SEMIARID TO PERIGLACIAL, IT SEEMS UNLIKELY THAT A SINGLE CLIMATIC CAUSE ALONG IS RESPONSIBLE FOR EXTINCTION.

OALS/CLIMATIC CHANGE/SOUTHWEST U.S./PLEISTOCENE EPOCH/GLACIAL GEOLOGY /QUATERNARY PERIOD/HABITATS/HERBIVORES/EXTIRPATED SPECIES

148

MEHRINGER, P.J.

1967 b

LATE QUATERNARY VEGETATION IN THE MOHAVE DESERT (USA).

REVIEW OF PALAEOBOTANY AND PALYNOLOGY, 2(1-4):319-320. GA 69B/615.

POLLEN AND C14 DATES IN NEVADA AND CALIFORNIA FROM ALLUVIUM, PLAYA CORES, AND ANCIENT SPRING DEPOSITS SHOW THAT THE PRESENT VEGETATION ZONES WERE REDUCED BY 1,000 M. DURING THE MAXIMUM WISCONSIN GLACIATION. SOUTHWARD VEGETATIONAL SHIFTS OF SEVERAL HUNDRED KILOMETRES ARE SHOWN. OTHER VEGETATIONAL CHANGES OF LESS MAGNITUDE ALSO ARE DISCUSSED. (AUTHOR)

NEVADA/CALIFORNIA/ALLUVIUM/VEGETATION ESTABLISHMENT/MOJAVE DESERT/ QUATERNARY PERIOD/RADIOCARBON DATING/PALEOBOTANY/GLACIAL DRIFT/OALS/ WGM

149

MENSCHING, H.

1970

FLAECHENBILDUNG IN DER SUDAN-UND SAHEL-ZONE (OBER-VOLTA UND NIGER) (FORMATION OF PLAINS IN THE SUDANESE AND THE SAHELIAN ZONES (UPPER VOLTA AND THE NIGER).

ZEITSCHRIFT FUER GEOMORPHOLOGIE, SUPPLEMENTBAND 10:1-29. MGA 23.2-480.

AN INVESTIGATION INTO THE MORPHODYNAMICS AND MORPHOGENESIS OF THIS AREA WAS UNDERTAKEN IN 1969 BY A TEAM OF GEOMORPHOLOGISTS. RESULTS OF THIS RESEARCH SHOW THAT THE SAHEL AND THE NORTHERN SUDANESE ZONE BELONG TODAY TO THE ARID MORPHODYNAMIC SYSTEM. FROM OLD TERTIARY TO THE END OF SEDIMENTATION OF THE CONTINENTAL TERMINAL, A CHANGE IN THE CLIMATE FROM SEMIHUMID TO MORE SEMIARID BEGAN. IN QUATERNARY, THE ARID MORPHODYNAMIC SYSTEM WAS SUBMITTED TO CHANGES ESPECIALLY IN THE MOUNTAINOUS REGION OF THE AIR, SIMILAR TO THE HOGGAR, BY AT LEAST TWO MORE HUMID MORPHOLOGICALLY EFFECTIVE PHASES. MORE STUDY IS NEEDED ON WHICH DEGREE OF CLIMATIC CHANGE IS NECESSARY TO EFFECT DECISIVELY THE

MORPHOGENESIS. CLIMATIC MORPHOLOGY MUST CONSIDER MORPHODYNAMICS, ESPECIALLY IN CONNECTION WITH THE FORMATION OF EROSION SURFACES. (AUTHOR)

OALS/GEOMORPHOLOGY/TERRAIN ANALYSIS/CLIMATIC GEOMORPHOLOGY/UPPER VOLTA/NIGER /ARID CLIMATE/PALEOCLIMATOLOGY /SUDAN/WEST AFRICA/SAHARA/ CLIMATIC CHANGE/PLAINS/SAHELIAN ZONE

150

MICHEL, A.A.

1972

THE IMPACT OF MODERN IRRIGATION TECHNOLOGY IN THE INDUS AND HELMAND BASINS OF SOUTHWEST ASIA. IN M.T. FARVAR AND J.P. MILTON, EDS., THE CARELESS TECHNOLOGY: ECOLOGY AND INTERNATIONAL DEVELOPMENT, P. 257-275.

NATURAL HISTORY PRESS, NEW YORK 1030 P.

A HUNDRED YEARS OF IRRIGATION DEVELOPMENT IN THE PUNJAB, BETWEEN 1849 AND 1949, SAW 40 MILLION ACRES BROUGHT UNDER CULTIVATION, BUT BY 1959, RISING WATER TABLES AND SALINITY PROBLEMS HAD SERIOUSLY DAMAGED 5 MILLION WITH BETWEEN FIFTY AND ONE HUNDRED THOUSAND ACRES ADVERSELY AFFECTED EACH SUCCEEDING YEAR. THE HELMAND VALLEY OF AFGHANISTAN HAS NOT BEEN SPARED THE SIMILAR CONSEQUENCES OF POOR PLANNING. THIS PAPER EMPHASIZES THE FACT THAT MAN HAS APPLIED MODERN TECHNOLOGY WITHOUT ANTICIPATING ITS IMPACT ON THE ECOLOGY, OFTEN IGNORING VALUABLE LESSONS FROM PAST PROJECTS. SOCIOLOGICAL REASONS FOR THIS FAILURE TO LEARN IS DISCUSSED, AND THE AUTHOR SUGGESTS THAT SOME SUCH BODY AS THE WORLD COURT BE GIVEN JURISDICTION OVER CLAIMS BY RECIPIENT OR DONOR GOVERNMENTS, OR BY LENDING AGENCIES, AGAINST CONTRACTORS AND CONSULTANTS FOR LOSSES SUSTAINED THROUGH NEGLIGENCE IN THE DESIGN AND EXECUTION OF PROJECTS.

OALS/AFGHANISTAN/IRAN/IRANIAN DESERT/PAKISTAN,WEST/HELMAND RIVER/ INDUS BASIN/INDIA/IRRIGATION EFFECTS/IRRIGATION PROGRAMS/IRRIGATION WELLS/SALINITY/WATER TABLE/GROUNDWATER/RIVER BASINS/SOCIAL ASPECTS/ ECONOMIC DEVELOPMENT/ECONOMIC IMPACT/WATER RESOURCES DEVELOPMENT/ ENVIRONMENTAL EFFECTS

151

MILLER, R.E. ET AL.

1968

GROUND-WATER HYDROLOGY OF THE CHAD BASIN IN BORNU AND DIKWA EMIRATES, NORTHEASTERN NIGERIA, WITH SPECIAL EMPHASIS ON THE FLOW LIFE OF THE ARTESIAN SYSTEM.

U.S. GEOLOGICAL SURVEY, WATER-SUPPLY PAPER 1757-I. 48 P. MGA 20.1-697.

THREE WATER-BEARING UNITS OCCUR WITHIN THE CHAD FORMATION. THE UPPER ZONE YIELDS WATER TO WELLS, THE MIDDLE FROM FLOWING ARTESIAN BOREHOLES WITH HEADS RANGING FROM A FEW FEET TO 70 FEET ABOVE LAND SURFACE THROUGHOUT A 13,000 SQUARE MILE AREA OF THE BASIN IN NIGERIA, AND THE LOWER ZONE ALSO FROM FLOWING BOREHOLES, THOUGH ITS AREAL EXTENT HAS

NOT BEEN PROVED BEYOND THE ENVIRONS OF MAIDUGURI. THE INVESTIGATION DESCRIBED HERE IS CONCERNED PRIMARILY WITH THE MIDDLE ZONE, THE SOURCE OF WATER FOR NEARLY 200 FLOWING BOREHOLES USED AS CATTLE WATERING POINTS IN THE NIGERIAN SECTOR OF THE CHAD BASIN.

NIGERIA/GROUNDWATER/WATER SUPPLY/ARTESIAN WELLS/WATER SOURCES/ BOREHOLES/AQUIFERS/SUBSURFACE WATERS/CHAD BASIN/OALS

152

MISRA, D.K./PRASAD, R./BHAN, S.

1968

RECLAMATION OF THE RAJPUTANA DESERT.

WORLD CROPS 20(3):18-24. SWRA W68-01242.

THE CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR, INDIA, STARTED DESERT CONTROL WORK ON THE RAJPUTANA DESERT IN 1952. ANALYSIS OF CONDITIONS SHOWS THAT THE DESERT IS LARGELY MAN-MADE AND COULD BE CORRECTED BY HUMAN EFFORTS. DESERT CONTROL WORK CONSISTS OF 1) PROPER CONTROL OF GRAZING, 2) UTILIZATION OF TREES AND BUSHES, 3) AFFORESTATION OF SAND DUNES AND ROCKY REFRACTORY SITES, AND 4) CREATION OF WINDBREAKS AND SHELTERBELTS TO PROTECT THE INROADS OF THE DESERT AND IMPROVE DRY-FARMING PRACTICES. THESE CONTROL MEASURES ARE DISCUSSED, IDENTIFYING SPECIES OF GRASSES, SHRUBS, AND TREES BEST SUITED FOR THE CLIMATIC CONDITIONS, DESCRIBING IMPROVEMENT IN FARMING METHODS THROUGH EDUCATION, AND STRESSING THE IMPORTANCE OF GOOD PRACTICES AND BENEFITS DERIVED.

PERTURBATION/INDIA/THAR DESERT/RAJASTHAN/DRY FARMING/GRAZING/RANGE MANAGEMENT/LAND MANAGEMENT/DESERTIFICATION/SHELTERBELTS/WINDBREAKS/ VEGETATION EFFECTS/LAND RECLAMATION/REFORESTATION/SAND CONTROL/SOIL CONSERVATION/WIND EROSION/OALS

153

MITCHELL, J.M., JR./KISS, E.

1964

ANNOTATED BIBLIOGRAPHY ON CLIMATIC CHANGES: GENERAL WORKS-THEORIES; AND ANNOTATED BIBLIOGRAPHY ON CLIMATIC CHANGES IN HISTORICAL TIMES: SYNTHETIC STUDIES.

METEOROLOGICAL AND GEOASTROPHYSICAL ABSTRACTS 15(11):2236-2284; (12):2434-2478.

THESE ARE TWO SUPPLEMENTARY COMPILATIONS ON CLIMATIC CHANGES: THE FIRST EMPHASIZES THE INSTRUMENTAL AND RECENT HISTORICAL PERIODS (I.E., GENERALLY WITHIN THE PAST MILLENIUM), AND THE SECOND DEALS WITH INTERRELATIONSHIPS BETWEEN FLUCTUATIONS OF DIFFERENT CLIMATIC VARIABLES AND ATMOSPHERIC CIRCULATION. INCLUDED ARE BOOKS, MONOGRAPHS, REVIEW ARTICLES, CONFERENCE SUMMARIES, ETC. EMPHASIS IS PLACED ON MATERIAL PUBLISHED SINCE 1950. EACH BIBLIOGRAPHY CONTAINS A

DETAILED OUTLINE OF CONTENTS WHICH IS STRUCTURED AS A SUBJECT INDEX.

OALS/BIBLIOGRAPHIES /PALEOCLIMATOLOGY/SOLAR RADIATION/METEOROLOGY/ ATMOSPHERIC CIRCULATION/OCEAN CURRENTS/PRECIPITATION(ATMOSPHERIC)/ TEMPERATURE RANGES/GLACIERS/WATER LEVEL FLUCTUATIONS /CLIMATIC-VEGETAL RELATIONSHIPS /ARIDITY/CLIMATIC CHANGE/GEOPHYSICS/GLACIERS/CLIMATIC GEOMORPHOLOGY/SEASONAL

154

MITCHELL, W.A.

1971

MOVEMENT AND PASTORAL NOMADISM: A TENTATIVE MODEL.

ROCKY MOUNTAIN SOCIAL SCIENCE JOURNAL 8(1):63-71. SWRA W71-13904.

PASTORAL NOMADISM IS A NON-INDUSTRIAL, NON-MECHANIZED WAY OF LIFE IN ARID AND SEMIARID REGIONS FOR GROUPS OF PEOPLE WHO RELY HEAVILY ON GRAZING ANIMALS FOR SUBSISTENCE. THE MOVEMENTS OF 6 NORTH AFRICAN NOMADIC TRIBES ARE DESCRIBED. EACH TRIBE UNDERGOES MOVEMENTS IN ACCORD WITH THE SPECIAL ENVIRONMENTAL, SOCIAL AND ECONOMIC CONSTRAINTS TO WHICH IT IS SUBJECT. SOME TRIBES MOVE VERTICALLY, OTHERS HORIZONTALLY, FOLLOWING WATER AND VEGETATION AVAILABILITY. SOME TRIBES SUPPLEMENT ANIMAL PRODUCTS WITH SEASONAL CROP PRODUCTS. ALTHOUGH MOST TRIBES MOVE REGULARLY WITHIN TERRITORIAL AND TRIBAL BOUNDARIES, OTHERS UNDERGO MIGRATORY DRIFT WHICH MAY OCCASIONALLY LEAD TO SOCIAL CONFLICT. COMPLEX INTERACTING ENVIRONMENTAL AND CULTURAL VARIABLES SEEM TO UNDERLIE ALL TRIBAL MOVEMENTS: HUMAN, POLITICAL AND SOCIAL VARIABLES; GRAZING ANIMAL NEEDS; ECONOMIC ACTIVITIES; AND THE HABITAT VARIABLES OF CLIMATE, SOILS, WATER, LANDFORMS AND VEGETATION. THESE VARIABLES ARE INCORPORATED INTO A MODEL IN WHICH THE CRITICAL FACTORS ARE WEATHER AND CULTURAL ACTIVITIES. THIS IS ANOTHER EXAMPLE OF THE EFFECT OF SOCIAL FACTORS ON RESOURCE UTILIZATION. (OALS)

OALS/NOMADS/SAHARA/SOCIAL ASPECTS/CULTURAL GEOGRAPHY/LIVESTOCK/ GRAZING/HUMAN BEHAVIOR/ECONOMIC GEOGRAPHY/REGIONAL GEOGRAPHY/MODELS/ ENVIRONMENT

155

MONOD, T.

1950

AUTOUR DU PROBLEME DU DESSECHEMENT AFRICAIN (ON THE PROBLEM OF DESICCATION IN AFRICA).

INSTITUT FRANCAIS D AFRIQUE NOIRE, BULLETIN 12(2):514-523.

REVIEWS CLIMATIC HISTORY SINCE THE PLIOCENE, NOTING CHANGES IN THE LANDSCAPE AND FAUNA RESULTING FROM MAN S ACTIVITIES. PROBLEMS OF DETERMINING CAUSES OF AND SOLUTIONS TO SPREADING DESERTIFICATION ARE DISCUSSED.

OALS/AFRICA/ARID LANDS/REFORESTATION/HISTORY/DESERTS/SEMIARID CLIMATE /ARID CLIMATE/DESERTIFICATION/PERTURBATION

156

MONOD, T.

1954

MODE CONTRACTE ET DIFFUS DE LA VEGETATION SAHARIENNE. IN J.L. CLOUDSLEY-THOMPSON, ED., BIOLOGY OF DESERTS: PROCEEDINGS OF A SYMPOSIUM ON THE BIOLOGY OF HOT AND COLD DESERTS, P. 35-44.

INSTITUTE OF BIOLOGY, LONDON. 223 P.

MAINLY A DISCUSSION OF DIFFERENCES OF VEGETATION RELATED TO TERRAIN, SUBSTRATUM, AND CLIMATE. CONSTRICTED VEGETATION FOUND UNDER VERY LOW RAINFALL, IS LIMITED TO OUEDS. DIFFUSE VEGETATION IS FOUND WHERE PRECIPITATION IS NOT LESS THAN 30 TO 50 MM IN THE NORTH, AND NOT LESS THAN 50 TO 100 MM IN THE SOUTH.

OALS/SAHARA/VEGETATION TYPES/PHYTOGEOGRAPHY/CLIMATIC-VEGETAL RELATIONSHIPS

157

MORRIS, E.H.

1948

MODERN OVERGRAZING BY LIVESTOCK AS THE DIRECT CAUSE OF RUIN OF SOUTHWESTERN AGRICULTURE, WITH A NOTE BY H.H. CHAPMAN.

JOURNAL OF FORESTRY 46(12):929-931.

REPRINT OF A PORTION (P. 5-8) OF THE AUTHOR S 1939 CARNEGIE INSTITUTION OF WASHINGTON PUBLICATION, ARCHAEOLOGICAL STUDIES OF THE LA PLATA DISTRICT, SOUTHWESTERN COLORADO AND NORTHWESTERN NEW MEXICO, DEALING WITH CONDITIONS IN THE PUEBLO AREA BEFORE THE ADVENT OF WHITE MAN AND THE GRAZING OF SHEEP AND CATTLE. OVERGRAZING DISTURBED THE EQUILIBRIUM OF A NATURAL BALANCE OF FORCES SUCH AS RAINFALL, EROSION, AND VEGETATION.

OALS/WGM/SWERVE/COLORADO BASIN/NEW MEXICO/GRAZING/RANGE MANAGEMENT/ EROSION/VEGETATION CHANGE/PERTURBATION/SOUTHWEST U.S./GULLY EROSION/ ARCHAEOLOGY/HISTORY/AGRONOMY/GRASSLAND BIOME

158

MUEGGLER, W.F.

1950

EFFECTS OF SPRING AND FALL GRAZING BY SHEEP ON VEGETATION OF THE UPPER SNAKE RIVER PLAINS.

JOURNAL OF RANGE MANAGEMENT 3(4):308-315. BA(25)3821.

VEGETAL TRENDS ON SAGEBRUSH-GRASS RANGE CAUSED BY A COMBINATION OF HEAVY SPRING AND LIGHT FALL GRAZING, 1924-1949, ARE COMPARED WITH TRENDS CAUSED BY HEAVY FALL GRAZING ALONE. THE TWO 80-ACRE PASTURES WERE ESSENTIALLY ALIKE IN 1924, BUT 25 YEARS LATER THE PASTURE GRAZED IN SPRING AND FALL PRODUCED (ESTIMATED AIR-DRY WEIGHT) 173 PERCENT AS

MUCH BRUSH, 72 PERCENT AS MUCH GRASS, AND 20 PERCENT AS MUCH FORBS AS THE PASTURE GRAZED ONLY IN FALL. OVER THREE-FOURTHS OF ITS VEGETATION WAS BRUSH, MOSTLY UNDESIRABLE SAGEBRUSH, BY 1949, WHILE BRUSH COMPOSED LESS THAN HALF THE VEGETATION OF THE PASTURE GRAZED ONLY IN FALL. THIS LATTER PASTURE REMAINED IN GOOD CONDITION WHILE THE PASTURE GRAZED BOTH IN SPRING AND FALL DETERIORATED TO POOR CONDITION WITH AN ESTIMATED GRAZING CAPACITY LESS THAN ONE-THIRD THAT OF THE OTHER.

OALS/WGM/SWERVE/GRAZING/SEASONAL/UTAH/RANGE MANAGEMENT/VEGETATION CHANGE/PERTURBATION/GRASSLAND BIOME/PLANT INVADERS/SHRUBS/FORBS/ CARRYING CAPACITY/RANGE GRASSES/FORAGE PRODUCTION/RANGES/PASTURES

159

MULAY, B.N.

1961

PATTERNS OF PLANT DISTRIBUTION IN RAJASTHAN.

INDIAN BOTANICAL SOCIETY, MEMOIRS 3:9-12.

GRAZING RATHER THAN CLIMATIC CHANGE IS PROPOSED HERE AS A CAUSE OF DESERT ENCROACHMENT UPON OTHER VEGETATION TYPES.

OALS/RAJASTHAN/PLANT DISTRIBUTION/GRAZING/CLIMATIC CHANGE/ DESERTIFICATION

160

MURRAY, A.V.

1959

AN ANALYSIS OF CHANGES IN SONORAN DESERT VEGETATION FOR THE YEARS 1928-1957.

UNIVERSITY OF ARIZONA (M.S. THESIS). 146 P.

CHANGES THAT HAVE TAKEN PLACE IN THE PERENNIAL VEGETATION OF A PERMANENTLY-MARKED AREA OF 800 SQUARE METERS, LOCATED IN THE SONORAN DESERT, TWO MILES WEST OF TUCSON, ARIZONA, WERE ANALYZED BY TWO TYPES OF QUANTITATIVE DATA. DATA WERE COLLECTED FROM VEGETATION MAPS TO SHOW THE LOCATION OF EACH PLANT, AND TO SHOW AN OUTLINE OF THE AREA OF SOIL SURFACE COVERED BY ITS CROWN. THE NUMBER OF INDIVIUALS PRESENT AT EACH MAPPING WERE COUNTED AS WELL AS THE AMOUNT OF CROWN COVERAGE PRESENT AT EACH MAPPING WAS MEASURED. RAINFALL VARIATION AFFECTED PLANT GROWTH, WITH VIGOROUS VEGETATIVE GROWTH TAKING PLACE WHEN WINTER RAINS WERE HEAVY, WHILE CHANGES IN THE NUMBERS OF SEEDLING ESTABLISHMENTS WERE CONTROLLED BY VARIATIONS IN THE DISTRIBUTION OF FALL RAINFALL. DROUGHT PERIODS BROUGHT ABOUT REDUCTION IN CROWN SIZES AND NUMBER OF INDIVIDUALS ONLY WHEN THEY OCCURRED DURING THE REGULAR SUMMER AND WINTER RAINY SEASONS. THERE WAS NO EVIDENCE THAT ANY SUCCESSIONAL CHANGES HAD TAKEN PLACE IN THE VEGETATION OF THE AREA OVER THE 29-YEAR PERIOD.

OALS/SONORAN DESERT/SOUTHERN DESERT SHRUB/PERENNIALS/ARIZONA/ QUANTITATIVE SAMPLING /RAINFALL/VEGETATION EFFECTS/SOIL SURFACES/ GRAZING/VEGETATION ESTABLISHMENT/SUCCESSION/TUMAMOC HILL

161

MURRAY, G.W.

1951

THE EGYPTIAN CLIMATE, AN HISTORICAL OUTLINE.

GEOGRAPHICAL JOURNAL 117:443-452.

REGULAR RAINFALL CEASED OVER EGYPT BELOW THE 500-METER CONTOUR SOMETIME ABOUT THE CLOSE OF THE PLIO-PLEISTOCENE PERIOD, THREE-QUARTERS OF A MILLION YEARS AGO. THE LIBYAN DESERT HAS EVER SINCE BEEN EXPOSED TO EROSION BY WIND ALONE. THE EARLIER EUROPEAN GLACIATIONS SEEM TO HAVE LEFT THE EGYPTIAN DESERTS DRY, BUT THE LONG SPAN OF DROUGHT WAS BROKEN BY AT LEAST TWO RAINY INTERLUDES: FIRST, WHEN THE DESERTS, BOTH EAST AND WEST OF THE NILE, WERE HABITABLE IN MIDDLE PALEOLITHIC TIMES, SECOND, WITH LIGHT RAINFALL, FROM ABOUT 8000-4000 B.C. AN OCCURRENCE OF SUBSOIL WATER NEAR THE SURFACE AT SHEB AND TARFAWI PERMITTED PEOPLE TO LIVE THERE IN OASES UNTIL ABOUT 3000 B.C., WHEN A DROP IN THE WATER TABLE RENDERED THESE PLACES UNINHABITABLE. SINCE CLASSICAL TIMES THE ZONE OF THE MEDITERRANEAN RAINFALL HAS MOVED A LITTLE FARTHER NORTH.

OALS/PALEOCLIMATOLOGY/HISTORY/GEOMORPHOLOGY/SOIL EROSION/WIND EROSION /DESERTS/ARID LANDS/PLEISTOCENE EPOCH/RAINFALL/ PRECIPITATION(ATMOSPHERIC)/CLIMATIC CHANGE/DESERTIFICATION/EGYPT/SUDAN /NILE RIVER

162

NAGATANI, R.M.

1968

THE DYNAMIC INFLUENCES OF DIABATIC HEAT SINKS AND THE HIMALAYAN MOUNTAIN RANGE ON THE VERTICLE MOTION FIELD OVER INDIA.

UNIVERSITY OF WISCONSIN (M.S.THESIS), 80 P./U.S. OFFICE OF NAVAL RESEARCH, CONTRACT NONR-1212(07). STAR N69-12333. AVAILABLE CFSTI AS AD-675 804.

PERHAPS ONE OF THE STRANGEST DESERTS TO BE FOUND ANYWHERE IS THE RAJASTHAN DESERT OF NORTHWEST INDIA, ALSO KNOWN AS THE RAJPUTANA OR THAR DESERT. IF THE DESERT WAS ONCE HABITABLE LAND, THE QUESTION ARISES AS TO WHAT CONTRIBUTED TO ITS DETERIORATION AND WHETHER THERE ARE ANY POSSIBILITIES OF REVERTING BACK TO ITS HABITABLE STATE. SINCE VERTICAL MOTIONS RESULTING FROM OTHER EFFECTS ARE ADDITIVE (IN THIS MODEL) TO RESULTS FROM HEATING, OTHER QUESTIONS ARE THOSE RELATED TO THE EFFECTS OF THE HIMALAYAS, SUCH AS THE VERTICAL VELOCITIES RESULTING FROM UPSLOPE AND DOWNSLOPE MOTIONS CAUSED BY WINDS BLOWING AGAINST THE HIMALAYAS. EFFECTS OF NEARBY MOUNTAINS ON FORCED INTERIOR CIRCULATIONS ARE ALSO INCLUDED.

RAJASTHAN/THAR DESERT/INDIA/PHYSICAL GEOGRAPHY/OROGRAPHY/CLIMATOLOGY/ ATMOSPHERIC CIRCULATION/DEGENERATION/DESERTS/OALS

163

NATIONAL ACADEMY OF SCIENCES, COMMITTEE ON ATMOSPHERIC SCIENCES

1973

WEATHER AND CLIMATE MODIFICATION, PROBLEMS AND PROGRESS.

SAME AS AUTHOR.

AREAS DELINEATED FOR FURTHER RESEARCH INCLUDE: 1) FOG SUPPRESSION, ESPECIALLY IN RELATION TO AIRPORT OPERATIONS, 2) PRECIPITATION MODIFICATION, DESIGNED PARTICULARLY TO INCREASE PRECIPITATION OVER WATERSHEDS, 3) MITIGATION OF SEVERE STORMS SUCH AS HURRICANES, AND 4) INADVERTENT WEATHER/CLIMATE MODIFICATION EFFECTS.

OALS/WEATHER MODIFICATION/ARTIFICIAL PRECIPITATION/STORMS/FOG/ ENVIRONMENTAL ENGINEERING/WATER YIELD IMPROVEMENT

164

NATIONAL INSTITUTE OF SCIENCES, INDIA

1952

SYMPOSIUM ON THE RAJPUTANA DESERT, PROCEEDINGS.

SAME AS AUTHOR. BULLETIN 1. 302 P.

THE MOST USEFUL SINGLE REPORT ON THE THAR DESERT AREA. THIS VOLUME CONTAINS SEPARATE PAPERS ON THE GEOLOGY, TOPOGRAPHY, METEOROLOGY, HYDROLOGY, SOILS, AND FLORA AND FAUNA OF THE THAR. THE SUPPOSED EVOLUTION OF THE INDIAN DESERT IS ALSO DISCUSSED, AS IS THE QUESTION OF POSSIBLE DESERT EXPANSION DURING RECENT YEARS.

OALS/DESERTIFICATION/THAR DESERT/INDIA/GEOLOGY/TOPOGRAPHY/METEOROLOGY /HYDROLOGY/SOIL TYPES/FLORA/ANIMAL POPULATIONS

165

NEWMAN, J.C./CONDON, R.W.

1969

LAND USE AND PRESENT CONDITION. IN R.O. SLATYER AND R.A. PERRY, EDS., ARID LANDS OF AUSTRALIA, P. 105-132.

AUSTRALIAN NATIONAL UNIVERSITY PRESS, CANBERRA. 321 P.

LAND USE PATTERNS IN ARID RANGELANDS OF AUSTRALIA HAVE BEEN CHARACTERIZED BY INITIAL BUILDUP OF HIGH STOCK NUMBERS WHICH MAY SUBSEQUENTLY FALL RAPIDLY BECAUSE OF DROUGHT AND/OR RABBIT INVASIONS AS WELL AS ECONOMIC DEPRESSIONS. HEAVY STOCKING IN PERIODS OF ABOVE-NORMAL RAINFALL LEADS TO SERIOUS DAMAGE WHEN DROUGHT FOLLOWS AND STOCK CANNOT BE MOVED RAPIDLY TO AREAS OF BETTER GRAZING CAPACITY. LONG-TIME USE UNDER SUCH CIRCUMSTANCES HAS RESULTED IN SEVERE EROSION DAMAGE IN DENUDED AREAS. INTELLIGENT GRAZING PRACTICES AND INFORMED

RANGE MANAGEMENT CAN IN TIME RESTORE THE CARRYING CAPACITY OF SUCH DEPLETED AREAS, AND INSURE THEIR LONG-TERM PRODUCTION CAPABILITY. (OALS)

OALS/DESERTIFICATION/LAND USE/LAND MANAGEMENT/LAND RECLAMATION/ GRAZING/AUSTRALIA/RANGE MANAGEMENT/LIVESTOCK/CARRYING CAPACITY/ PRODUCTIVITY/LAGOMORPHA/DROUGHTS/PASTURES

166

NEYMAN, J./OSBORN, H.B.

1971

EVIDENCE OF WIDESPREAD EFFECTS OF CLOUD SEEDING AT TWO ARIZONA EXPERIMENTS.

NATIONAL ACADEMY OF SCIENCES, PROCEEDINGS 68(3):649-652.

THE AVERAGE EFFECT OF TWO CLOUD SEEDING EXPERIMENTS (1957-1960, 1961, 1962, AND 1964) OVER THE SANTA CATALINA MOUNTAINS, ARIZONA, ON THE 24-HOUR PRECIPITATION AT WALNUT GULCH 65 MILES AWAY, WAS AN APPARENT 40 PERCENT LOSS OF RAINFALL (P=0.025) ON SEEDED, AS OPPOSED TO NOT-SEEDED, EXPERIMENTAL DAYS. LARGER APPARENT LOSSES, SOME HIGHLY SIGNIFICANT, WERE FOUND FOR EXPERIMENTAL DAYS ON WHICH WLANUT GULCH, WAS DOWNWIND FROM THE SEEDING SITE (BUT NOT ON UPWIND DAYS), AND ALSO ON SECOND DAYS OF THE RANDOMIZED PAIRS (BUT NOT ON FIRST DAYS). THE TIMING OF SIGNIFICANT APPARENT EFFECTS INDICATED THAT THE AFTERNOON MAXIMUM OF PRECIPITATION, WHICH IS VERY PRONOUNCED ON DAYS WITHOUT SEEDING, IS EITHER ABSENT OR WEAKENED ON DAYS WITH SEEDING. THIS PHENOMENON WAS OBSERVED EARLIER IN A STUDY OF THE WHITETOP PROJECT. (AUTHORS)

WAT-C/OALS/ARIZONA/SANTA CATALINA MOUNTAINS/WALNUT GULCH/CLOUD SEEDING/WEATHER MODIFICATION/RAINFALL/WEATHER PATTERNS/CLIMATIC DATA

167

NORIN, E.

1932

QUATERNARY CLIMATIC CHANGES WITHIN THE TARIM BASIN.

GEOGRAPHICAL REVIEW 22:591-598.

DURING THE ICE AGE THE GLACIERS OF THE KUNLUN EXTENDED DOWN TO THE TARIM BASIN AND FORMED LARGE PIEDMONT GLACIERS OUTSIDE THE VALLEY MOUTHS. IN THE MOUNTAINS OF KURUK TAGH NO EVIDENCE OF QUATERNARY GLACIATION IS TO BE FOUND, THIS REGION CONSTITUTING A REFUGE FOR FAUNA AND FLORA. TRAVELERS HAVE GIVEN ABUNDANT PROOFS OF A PROGRESSIVE DESICCATION OF CERTAIN PORTIONS OF THE TARIM BASIN DURING HISTORICAL TIMES. IN SOME CASES DESICCATION HAS BEEN CAUSED BY THE RIVERS CHANGING THEIR BEDS. APART FROM THESE BY FAR THE LARGEST NUMBER OF ANCIENT DESERT SITES AND DEAD FORESTS ARE FORMED ALONG THE SOUTHERN RIM OF THE TARIM BASIN WHEREAS THERE ARE FEW ALONG ITS NORTHERN RIM. SEVERAL OF THE SOUTHERN SITES SEEM TO HAVE BEEN DESERTED BECAUSE OF A DIMUNITION OF THE VOLUME OF THE RIVERS THAT ONCE SUPPLIED THE IRRIGATION WATER. THIS REDUCTION OF THE WATER SUPPLY MAY HAVE BEEN

CAUSED BY THE DISAPPEARANCE OR REDUCTION OF RESIDUAL POSTGLACIAL GLACIERS IN THE HEADWATER REGIONS.

OALS/DESERTS/ARID LANDS/HISTORY/PALEOCLIMATOLOGY/GLACIERS/WATER SUPPLY/WATER SOURCES/RIVER BASINS/QUARTERNARY PERIOD/TARIM BASIN/ BASINS/CLIMATIC GEOMORPHOLOGY/CLIMATIC CHANGE/DESERTIFICATION/ DESICCATION/TAKLA MAKAN DESERT/CHINA

168

NOWINSON, D.

1972

OUR DIMINISHING DESERT.

ECOLOGY TODAY 2(3):32-33.

SINCE 1968 RECREATIONAL USE OF THE MOJAVE AND COLORADO DESERTS IN CALIFORNIA HAS INCREASED BY 50 PERCENT, TO 7.5 MILLION VISITOR DAYS IN 1971. THIS GROWING INVASION OF OFF-ROAD VEHICLES HAS RESULTED IN PHYSICAL DAMAGE TO PACKED SAND AND DESERT SOIL, AS WELL AS TO PLANTS, ANIMALS, AND ARCHEOLOGICAL REMAINS FROM LITTERING AND VANDALISM. THE U.S. BUREAU OF LAND MANAGEMENT, AS ADMINISTRATOR OF 11 MILLION ACRES OF CALIFORNIA DESERT, IS MAKING RECOMMENDATIONS FOR THE USE, PROTECTION, AND LONG RANGE PLANNING AND DEVELOPMENT OF THIS DESERT RESOURCE.

OALS/MOJAVE DESERT/COLORADO DESERT/CALIFORNIA/RECREATION/SANDS/DESERT SOILS/DESERT PAVEMENT/CRUSTS/LAND USE/LAND MANAGEMENT/LAND RESOURCES/ CONSERVATION/WIND EROSION/DESERTIFICATION/VANDALISM/PERTURBATION

169

PALMER, W.C./DENNY, L.M.

1971

DROUGHT BIBLIOGRAPHY. TECHNICAL MEMO.

NOAA-TM-EDS-20. 248 P. AVAILABLE NTIS AS COM-71-00937.

THE COMPILATION OF REFERENCES ON DROUGHT COVERS THE LITERATURE THROUGH 1968. THE BIBLIOGRAPHY CONSISTS OF REFERENCES, WITH ABSTRACTS WHERE AVAILABLE, TO LITERATURE ON THE SUBJECT OF AGRICULTURAL, HYDROLOGIC, AND METEOROLOGICAL DROUGHT. A SHARP LINE IS DRAWN TO EXCLUDE MATERIAL THAT MAY BE RELATED TO, BUT NO SPECIFICALLY PERTINENT TO DROUGHT. BASIC TO THIS APPROACH WAS THE CONVICTION THAT DROUGHT IS A CONDITION OF PROLONGED AND ABNORMAL DRYNESS. THUS, MOST PAPERS DEALING WITH DESERT OR ARID ZONES ARE EXCLUDED BECAUSE DRYNESS IS THE NORMAL STATE OF SUCH REGIONS. (AUTHORS)

OALS/DROUGHTS/BIBLIOGRAPHIES/ABSTRACTS/AGRICULTURE/HYDROLOGY/ METEOROLOGY/CLIMATIC CHANGE/CLIMATOLOGY

170

PARSONS, K.H.

1965

THE TUNISIAN PROGRAM FOR COOPERATIVE FARMING.

LAND ECONOMICS 41(4):303-316. GA 69D-1054.

TUNISIA FORMERLY HAD A DUAL AGRICULTURE, WITH LARGE EFFICIENT FOREIGN-OWNED ESTATES CONTRASTING WITH TRADITIONAL PEASANT CULTURE, AND WITH THE SOUTHERN PART OF THE COUNTRY CHARACTERIZED BY WANDERING SHEPHERD TRIBES. WITH INDEPENDENCE, THE ESTATES HAVE BEEN TAKEN OVER AND ARE NOW HELD BY TUNISIANS BOTH AS INDIVIDUALS AND AS MEMBERS OF COOPERATIVES. THE ROLE OF THE MEDJERDA VALLEY PROGRAMME, THE FIRST MAJOR AGRICULTURAL DEVELOPMENT PROJECT IN THE COUNTRY, IS EXAMINED AS A PRECEDENT. IT IS HOPED TO CONTINUE THE MODERNIZATION IN THE NORTH, AND DEVELOP TREE CROPS SUCH AS OLIVES IN THE SOUTH, AS WELL AS TO CONTROL LIVESTOCK GRAZING. EDUCATION, TRAINING, AND HEALTH SCHEMES ARE PART OF THE COOPERATIVE STRUCTURE, TO WHICH THE NATURAL PROPENSITY TOWARD GROUPING OF THE TRIBAL SOUTH CAN BE DIRECTED. (OALS)

SOCIAL ASPECTS/POLITICAL ASPECTS/AGRONOMY/TUNISIA/SAHARA/HISTORY/ ECONOMIC DEVELOPMENT/NOMADS/LIVESTOCK/OLIVE TREES/ECONOMIC GEOGRAPHY/ LAND USE/ECONOMIC IMPACT/OALS/MEDJERDA/ETHNOLOGY

171

PEARSE, C.K.

1970

RANGE DETERIORATION IN THE MIDDLE EAST.

INTERNATIONAL GRASSLAND CONGRESS, 11TH, 1970, SURFERS PARADISE, PROCEEDINGS. P. 26-30.

SEVERE RANGE DETERIORATION IN THE MIDDLE EAST BEGAN ABOUT THE TURN OF THE CENTURY. FACTORS INCREASING THE DEPLETION INCLUDE INCREASED LIVESTOCK NUMBERS, PLOUGHING OF RANGELAND, FUEL PLANT REMOVAL, CHANGE FROM NOMADIC TO SEDENTARY GRAZING, DEVELOPMENT OF LIVESTOCK WATERING, IMPROVED VETERINARY SERVICE AND SUPPLEMENTAL FEEDING. WIDESPREAD WIND AND WATER EROSION OF DENUDED RANGELAND THREATENS THE FUTURE DEVELOPMENT OF THE AREA. (AUTHOR)

DESERTS/OALS/MIDDLE EAST/DENUDATION/EROSION/WEATHERING/ANIMAL DAMAGE /LIVESTOCK/POLLUTION/DESICCATION/LAND RECLAMATION/DESERTIFICATION/ RANGE MANAGEMENT

172

PEEL, R.F.

1966

THE LANDSCAPE IN ARIDITY.

INTSTUTE OF BRITISH GEOGRAPHERS, TRANSACTIONS AND PAPERS, PUBLICATION 38. 23 P.

THE PAPER REVIEWS VARIOUS PROBLEMS INHERENT IN THE GEOMORPHOLOGICAL INTERPRETATION OF THE EARTH S ARID LANDSCAPES. THESE STEM FROM TWO MAIN FACTORS, THE VARIABILITY OF THE PAST CLIMATIC CONDITIONS IN THE ARID ZONES, AND CONSIDERABLE DEFICIENCIES IN OUR KNOWLEDGE OF THE CHARACTER AND RATES OF THE ARID PROCESS OPERATING TODAY. A BRIEF REVIEW OF TERRESTRIAL ARIDITY THROUGHOUT GEOLOGICAL TIME, AND OF THE GEOLOGICAL CRITERIA OF PAST ARIDITY, IS FOLLOWED BY A SUMMARY OF CURRENT IDEAS ON THE CLIMATIC HISTORY OF THE SAHARA AND OF THE EVIDENCE UPON WHICH THESE ARE BASED. THE AUTHOR FINDS NO PROGRESSIVE CLIMATIC DETERIORATION IN THE SAHARA. FLUCTUATIONS IN TOPOGRAPHIC PHENOMENA IN THE SENSITIVE MARGINAL BELTS SEEM BETTER EXPLAINED BY QUITE DIFFERENT FACTORS, NOT THE LEAST BEING THE INTERFERENCE OF MAN AND HIS GRAZING ANIMALS. IN THE REALM OF WIND-ACTION THE MAIN PROBLEMS ARE THE MODES OF ORIGIN OF THE GREAT ERGS AND SAND-SEAS, THE ORIENTATION PATTERNS OF MAJOR DUNE SYSTEMS, AND THE GEOMORPHOLOGICAL POTENTIALITIES OF WIND-EROSION.

OALS/ARID LANDS/ARID CLIMATE/GEOMORPHOLOGY/PALEOCLIMATOLOGY/ CLIMATOLOGY/GRAZING/DUNES/EROSION/WEATHERING/DESERTS/WIND EROSION/ GEOLOGIC TIME/CLIMATIC GEOMORPHOLOGY/WIND ACTION/ARIDITY/SAND DUNES/ DESERTIFICATION/SAHARA/CLIMATIC CHANGE/ERGS

173

PETERSON, J.T./BRYSON, R.A.

1968

INFLUENCE OF ATMOSPHERIC PARTICULATES ON THE INFRARED RADIATION BALANCE OF NORTHWEST INDIA.

NATIONAL CONFERENCE ON WEATHER MODIFICATION, 1ST, ALBANY, N.Y., 1968, PROCEEDINGS P. 153-162. MGA 19.11-348.

FIELD STUDY OF INDIAN CLIMATE WAS CONDUCTED IN LATE APRIL 1966. THE EFFECTS OF QUARTZ AEROSOLS, WATER VAPOR, AND CARBON DIOXIDE ON INFRARED RADIATIVE TRANSFER WERE CONSIDERED. THE DATA INDICATE THAT THE DIFFERENCE BETWEEN THE INFRARED UPWARD FLUX OBSERVED AND THAT WHICH IS CALCULATED IS RELATED TO THE AMOUNT OF DUST IN THE ATMOSPHERE.

INDIA/INFRARED RADIATION/WEATHER MODIFICATION/METEOROLOGY/RADIATION/ OALS

174

PETERSON, R.A.

1969

INTERNATIONAL PROGRAM FOR IMPROVING ARID AND SEMIARID RANGELANDS. IN W.G. MCGINNIES AND B.J. GOLDMAN, EDS., ARID LANDS IN PERSPECTIVE, P. 297-309.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCENCE, WASHINGTON, D.C. AND UNIVERSITY OF ARIZONA PRESS, TUCSON.

FAO EXPERIENCE IN KENYA, SENEGAL, SYRIA, IRAN, AND PANAMA IS CITED TO ILLUSTRATE RELEVANT PROBLEMS. RELATIONSHIPS BETWEEN EXCESSIVE GRAZING, PLANT GROWTH, SEASONAL VARIATION AND SUPPLY OF FORAGE PLANTS, NOMADISM AND TRANSHUMANCE ARE DISCUSSED. THE NEED FOR INTEGRATION OF AGRICULTURAL AND LIVESTOCK PRODUCTION AND FOR TRAINING IN RANGE MANAGEMENT IS STRESSED.

OALS/WGM/ARID CLIMATE/ARID LANDS/SEMIARID CLIMATE/RANGES/RANGE MANAGEMENT/ECONOMIC IMPACT/GRAZING/PLANT GROWTH/SEASONAL/ VARIABILITY(ENVIRONMENTAL)/FORAGE PLANTS/FORAGE PRODUCTION/FORAGE SUPPLY/LIVESTOCK/PRODUCTIVITY/AREA STUDIES/NOMADS/TRANSHUMANCE

175

PETERSON, R.A.

1970

LAND UTILIZATION IN NONIRRIGATED AREAS. IN H.E. DREGNE, ED., ARID LANDS IN TRANSITION, P. 435-449.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, WASHINGTON, D.C., PUBLICATION 90. SWRA W71-08453.

THE MAJOR FORM OF LAND UTILIZATION IN MOST ARID REGIONS IS ANIMAL PRODUCTION THROUGH GRAZING. POPULATION INCREASES IN MOST ARID LANDS IMPLY THAT BOTH SOCIAL AND RESOURCE UTILIZATION FACTORS MUST BE REVISED. ARID ZONES PRESENT SEVERAL UNIQUE FACTORS THAT RENDER THEIR DEVELOPMENT DIFFICULT: 1) INTENSITY OF USE IS LOW IN COMPARISON WITH MORE FAVORED REGIONS, AND MISGUIDED ATTEMPTS AT OVERINTENSIFICATION MORE QUICKLY LEAD TO ENVIRONMENTAL DEGRADATION; 2) CAPITAL INPUTS YIELD RELATIVELY LOW INCREMENTS IN PRODUCTION, THEREBY DISCOURAGING INFLOW OF NEW CAPITAL; 3) INTENSIFICATION MUST BE HORIZONTAL RATHER THAN VERTICAL, OWING TO LIMITED ABSORPTIVE CAPACITY; 4) LAND USES HAVE BEEN POORLY INTEGRATED AND MULTIPLE USAGE HAS BEEN LIMITED; 5) MOST COUNTRIES WITH ARID ZONES HAVE BEEN RELUCTANT TO INVEST IN RESEARCH AND DEVELOPMENT, PREFERRING MORE INTENSIVE EXPLOITATION OF THEIR HUMID REGIONS. A NUMBER OF DETAILED SUGGESTIONS ARE ADVANCED, INVOLVING INSTITUTIONAL MECHANISMS, RESOURCE EVALUATION, EDUCATION, RESEARCH, INSTITUTIONAL REORGANIZATION, CAPITAL INCENTIVES AND WATER DEVELOPMENT. (OALS)

ARID LANDS/LAND USE/GRAZING/ECONOMIC DEVELOPMENT/ECONOMIC GEOGRAPHY/ ENVIRONMENTAL EFFECTS/CONSERVATION/SOCIAL ASPECTS/ECOSYSTEMS/LAND MANAGEMENT/DRY FARMING/OALS

176

PETROV, M.P.

1966

ESHCHE RAZ OB USYKHANII AZII (ON THE DESICCATION OF ASIA).

VESESOYUZNOYO GEOGRAFICHESKOYO OBSHCHESTVO, IZVESTIYA 98(3):205-211.

TWO ASPECTS OF THE DESICCATION OF ASIA ARE OBSERVED: INCREASING CLIMATIC ARIDITY AND THE CONSEQUENT SPREAD OF TRUE DESERT ENVIRONMENTS. THESE PHENOMENA CAN BE EXPLAINED BY THE RETREAT OF GLACIERS, PREDOMINANCE OF SURFACE DEFLATION AND EROSION PROCESSES, PARTIAL TRANSITION FROM DEFINED DRAINAGE SYSTEMS TO MORE DIFFUSE PATTERNS, REDUCTION OF LAKE SURFACES AND THEIR SALINATION, DEGRADATION OF PLAKOR VEGETATION, EVEN TO ITS TOTAL DISAPPEARANCE, LACK OF PROGRESS IN INTRODUCING NEW SPECIES OF FLORA AND FAUNA, SALINATION OF PLAKOR SOILS, AND THE PREVALENCE OF SALT CRUSTS. (OALS)

OALS/DESICCATION/DESERTIFICATION/MIDDLE ASIA/ARIDITY/CLIMATIC CHANGE/ SALINE LAKES/SALINE SOILS/CRUSTS/DEGENERATION/EROSION/ENVIRONMENTAL EFFECTS/DESERT SOILS/CLIMATIC GEOMORPHOLOGY/DRAINAGE PATTERNS

177

PETROV, M.P.

1966 - 1967

PUSTYNI TSENTRAL NOI ASII (DESERTS OF CENTRAL ASIA).

NAUKA, LENINGRAD. 2 VOLUMES. TRANSLATION AVAILABLE FROM NTIS AS JPRS 39145, JPRS 42772.

THESE TWO VOLUMES DISCUSS THE PHYSIOGRAPHY (CLIMATE, GEOMORPHOLOGY, SOILS, VEGETATION, HYDROLOGY) OF THE DESERTS OF CENTRAL ASIA. VOLUME I CONCENTRATES ON THE ORDOS, ALASHAN, AND PEISHAN DESERTS, WHILE VOLUME II DEALS WITH THE TARIM BASIN, THE TSAIDAM BASIN, AND THE HOHSI CORRIDOR. BOTH VOLUMES GIVE SPECIAL ATTENTION TO DESCRIBING THE MAJOR SAND DUNE PATTERNS AND EOLIAN MIGRATIONS AS WELL AS TO ANALYZING THE CHEMICAL AND MINERALOGICAL COMPOSITION OF THE SANDS. THE NAMES AND LOCATIONS OF SOIL-ANALYSIS AND WEATHER STATIONS ARE GIVEN. NUMEROUS MAPS AND PHOTOGRAPHS EFFECTIVELY ILLUSTRATE TEXTUAL DESCRIPTIONS. SOME 200 REFERENCES ARE LISTED, PRIMARILY RUSSIAN AND CHINESE, IN VOLUME II, AS WELL AS A GEOGRAPHIC INDEX OF PLACE NAMES AND LATIN NAMES OF VEGETATION.

AFFORESTATION/OALS/ORDOS/GEOMORPHOLOGY/TARIM BASIN/MAPS/CLIMATE/ VEGETATION/HYDROLOGY/CENTRAL ASIA/SAND DUNES /SOIL ANALYSIS/DESERT SOILS/WEATHER DATA /EOLIAN SOILS/DESERTIFICATION/TRANSLATIONS/SAND DESERTS/DESERTS/TAKLA MAKAN DESERT /CHINA/SINKIANG/WIND ACTION /GOBI

178

PETROV, M.P.

1971

SAND STABILIZATION METHODS IN ARID LANDS; PROTECTION OF AGRICULTURAL AND SETTLEMENT AREAS. IN W.G. MCGINNIES, B.J. GOLDMAN, AND P. PAYLORE, EDS., FOOD, FIBER AND THE ARID LANDS, P. 355-368.

UNIVERSITY OF ARIZONA PRESS, TUCSON. SWRA W72-03671.

MOBILE SANDS, OFTEN THE RESULT OF MAN S ACTIVITIES, ARE SOMETIMES SERIOUSLY DAMAGING TO THE ECONOMY OF AN AREA. WORLDWIDE EXPERIENCE IN ATTEMPTING TO COPE WITH THE PROBLEM HAS RESULTED IN A NUMBER OF MEANS TO ACHIEVE STABILIZATION, INCLUDING VEGETATIVE AND PHYSICOCHEMICAL. THIS PAPER DESCRIBES THREE MAJOR TYPES OF SANDY AREAS AND EIGHT MAJOR GROUPS OF VEGETATION SITES, INCLUDING SEMIARID WHERE TREE-SHRUBS AND PERENNIAL ACHIEVE THE BEST RESULTS, AND ARID WHERE LOW SHRUBS AND PERENNIAL AND ANNUAL GRASSES MAY BE USED IF PROTECTED BY WINDBREAKS. FOR EXTREMELY ARID AREAS, PHYSIOCOCHEMICAL RECLAMATION IS MORE SUCCESSFUL USING CLAY, BUTUMEN, RUBBER, POLYMERS, AND OTHER COVERS. RESEARCH AND DEVELOPMENT WORK STILL NECESSARY IS DETAILED.

OALS/SAND CONTROL/DESERTIFICATION/SOIL STABILIZATION/ REGENERATION(VEGETATION)/SYNTHETIC ELASTOMERS/VEGETATION ESTABLISHMENT /REVEGETATION/SHELTERBELTS

179

PEVETZ, W.

1968

ZUR LAGE DES NOMADISMUS IN DEN TROCKENGEBIETEN DER ALTEN WELT (THE PLACE OF NOMADISM IN THE ARID ZONES OF THE ANCIENT WORLD).

MONATSBERICHTE UBER DIE OESTERREICHISCHE LANDWIRTSCHAFT 15(7):348-355. GA 69C-1212.

A BALANCE IS DRAWN BETWEEN ADVOCATING GRADUAL ABOLITION OF NOMADISM BECAUSE OF ITS LOW CONTRIBUTION TO ECONOMIC GROWTH AND EFFORTS TO ADJUST NOMADS ACTIVITY AND EDUCATIONAL BACKGROUND TO THE NEEDS OF ECONOMIC DEVELOPMENT. THIS ENTAILS THE SETTLEMENT OF NOMADS, AND THE EXPANSION OF ARABLE AREAS, AND INVOLVES A RISK OF DESTROYING THE BALANCE OF A MODEST SOIL UTILIZATION BY PRIMITIVE PASTURING UNDER CONDITIONS WHERE THE PLOUGH CAUSES SOIL EROSION AND COMPLETE DESTRUCTION OF FERTILITY. SOCIOLOGICAL ASPECTS CULMINATING IN THE TRADITIONAL ANTAGONISM BETWEEN NOMADS AND SETTLED FARMERS ARE ALSO DISCUSSED.

OALS/NOMADS/ECONOMICS/SETTLEMENTS/HUMAN BEHAVIOR/ARABLE LAND/ DESICCATION/DESERTIFICATION/SOCIAL ASPECTS/LAND RESOURCES

180

PHILLIPS, F.R.S.E.

1954

ASPECTS OF THE ECOLOGY AND PRODUCTIVITY OF SOME OF THE MORE ARID REGIONS OF SOUTHERN AND EASTERN AFRICA. IN J.L. CLOUDSLEY-THOMPSON, ED., BIOLOGY OF DESERTS. THE PROCEEDINGS OF A SYMPOSIUM ON THE BIOLOGY OF HOT AND COLD DESERTS. P. 156-161.

INSTITUTE OF BIOLOGY, LONDON.

OUTLINES PROBLEMS OF INCREASING DESICCATION AND DESERTIFICATION IN THE NAMIB DESERT, GREAT NAMA LAND DESERT, KARROO, KALAHARI, DRY TROPICAL/SUB-TROPICAL REGIONS OF SOUTHERN AND EASTERN AFRICA AND SUB-ARID REGIONS OF TRANSVAAL, BECHUANALAND, SOUTHERN RHODESIA AND TANGANYIKA. POOR GRAZING MANAGEMENT IS RESPONSIBLE FOR PRESENT DETERIORATION OF THESE AREAS. LARGE-SCALE MECHANIZED CROP PRODUCTION SHOULD NOT BE ATTEMPTED IN SUB-ARID REGIONS. PRESENCE OF THE TSETSE FLY HAS SAVED SOME AREAS FROM DESTRUCTION THROUGH OVERGRAZING.

SOUTH WEST AFRICA/OALS/ARID LANDS/ARID CLIMATE/SEMIARID CLIMATE/ GRAZING/PRODUCTIVITY/RANGE MANAGEMENT/CONSERVATION/DEGENERATION/ PERTURBATION/EAST AFRICA/DESERTIFICATION/DESICCATION/KALAHARI-NAMIB/ KARROO/TROPICAL REGIONS/SOUTH AFRICA/CLIMATIC-VEGETAL RELATIONSHIPS

181

PHILLIPS, J.

1965a

FIRE--AS MASTER AND SERVANT: ITS INFLUENCE IN BIOCLIMATIC REGIONS OF TRANS-SAHARAN AFRICA.

TALL TIMBERS FIRE ECOLOGY CONFERENCE, 4TH, 1965, TALL TIMBERS RESEARCH STATION, TALLAHASSEE, FLORIDA, PROCEEDINGS P. 7-109.

A COMPREHENSIVE REVIEW AND HISTORICAL RESUME OF THE EFFECTS OF FIRE ON VEGETATION, ANIMAL ASSOCIATES, AERIAL FACTORS (MICROCLIMATIC), SOILS AND MAN IN TRANS-SAHARAN AFRICA. THE COMPLEXITIES OF THE USE AND ABUSE OF FIRE AS A MANAGEMENT TOOL ARE DISCUSSED AND RELATED TO THE PECULIARITIES OF EACH BIOCLIMATIC REGION; HIGHLY HUMID FOREST, HUMID FOREST, HUMID MONTANE FOREST, DERIVED WOODED SAVANNA, SUBHUMID WOODED SAVANNA, SUBDESERT WOODED SAVANNA, SUBARID WOODED SAVANNA, ARID WOODED SAVANNA, MILD SUBARID WOODED SAVANNA, KAROO SUBDESERT, MACCHIA (FYNBOS), OPEN GRASSLAND. EFFECTS OF BURNING ARE DISCUSSED IN RELATION TO THE SEASON OF BURNING. BENEFICIAL AND HARMFUL RESULTS OF BURNING ARE CONSIDERED FOR THE MAJOR SPECIES OF WILDLIFE OF EACH REGION. SEVERAL ASPECTS OF BURNING IN RELATION TO SOIL CHANGES ARE TREATED; ORGANIC MATTER, PH, NUTRIENTS, SOIL MOISTURE, RUN-OFF, EROSION, SOIL SURFACE. THE EFFECTS OF FIRE UPON MAN S WELFARE IS DISCUSSED AND THE AUTHOR MAKES A PREDICTION OF THE DETERIORATION OF NATURAL VEGETATION, SOIL AND WATER RESOURCES ACCORDING TO BIOCLIMATIC REGION (DUE TO FORM OF CULTIVATION, INTENSITY OF GRAZING AND BROWSING, SEASON AND SEVERITY OF BURNING AND OTHER HUMAN ACTIVITIES).

RECOMMENDATIONS ARE MADE FOR IMPLEMENTATION OF THE WISE USE OF FIRE IN THIS AREA.

REGENERATION(VEGETATION)/VEGETATION CHANGE/DESERTIFICATION/OALS/ BURNING/CONTROLLED BURNING/AFRICA/KARROO/SOUTH AFRICA/ARID LANDS/ SEMIARID CLIMATE/SAVANNA/GRASSLAND BIOME/DESERT GRASSLAND/ MICROCLIMATOLOGY/PH/ORGANIC MATTER/NUTRIENTS/SOIL MOISTURE/RUNOFF/SOIL EROSION/SOIL SURFACES/GRAZING/SEASONAL/LAND MANAGEMENT/RANGE MANAGEMENT/MAMMALS/UNGULATA/WILDLIFE/BIOLOGICAL COMMUNITIES/ ENVIRONMENTAL EFFECTS/RODENTS/PERTURBATION/SUCCESSION/LAND USE/ VEGETATION EFFECTS

182

PHILLIPS, J.

1965b

TRANS-SAHARAN AFRICA 40 YEARS ONWARD: SOME ECOLOGICAL AND RELATED CHANGES.

SOUTH AFRICAN JOURNAL OF SCIENCE 61(5):191-198.

TRANS-SAHARAN AFRICA WILL CHANGE MORE PROFOUNDLY DURING THE NEXT FORTY YEARS THAN OVER PAST CENTURIES. AGAINST THE BACKGROUND OF THE BIO-CLIMATIC REGIONS DESCRIBED BY THE AUTHOR PREVIOUSLY, THIS REVIEW TOUCHES UPON CHANGES IN BIOTIC COMMUNITIES AND INTER-RELATED RESOURCES, CROP AND LIVESTOCK POTENTIALITIES WITHIN THE BIO-CLIMATIC REGIONS; CHANGES IN FOREST RESOURCES, IN THE USAGE OF NON-RENEWABLE RESOURCES, IN HEALTH, EDUCATION, CULTURE, AND POPULATION; AND SOCIO-POLITICAL CHANGES. THE IMPORTANCE OF SELF-HELP AND THE NECESSITY FOR FOREIGN AID, FINANCIAL AND OTHER, ARE OUTLINED.

OALS/SAHELIAN ZONE/AFRICA/BIOCLIMATOLOGY/NATURAL RESOURCES/SOCIAL ASPECTS/ENVIRONMENTAL EFFECTS/SOUTH AFRICA/EAST AFRICA/BIOGEOGRAPHY/ ECOLOGY/ECONOMIC DEVELOPMENT

183

PRAKASH, I.

1963

ZOO-GEOGRAPHY AND EVOLUTION OF THE MAMMALIAN FAUNA OF RAJASTHAN DESERT, INDIA.

MAMMALIA 27(3):342-351.

THE RAJASTHAN DESERT HAS COMPARATIVELY A VERY RECENT ORIGIN. IT IS GEOLOGICALLY EVIDENT THAT THIS REGION WAS WELL WOODED IN THE PLEISTOCENE WITH MANY GENERA AND SPECIES OF MAMMALS. IT IS ASSUMED THAT WITH THE ADVENT OF ARIDITY MANY PERISHED. THEN, CERTAIN MAMMALS FROM THE PALAEARCTIC REGION MOVED INTO THE NEWLY FORMED DESERT. IT IS FOUND THAT 56.4 PERCENT OF MAMMALS OF THE RAJASTHAN DESERT ARE PALAEARCTIC, 41 PERCENT ARE INDO-MALAYAN AND 2.6 PERCENT ARE ENDEMIC.

OALS/EVOLUTION/ZOOGEOGRAPHY/DESERTS/ARID LANDS/ASIA/BIOGEOGRAPHY/ PLEISTOCENE EPOCH/MAMMALS/WILDLIFE/RAJASTHAN DESERT/INDIA/CLIMATIC CHANGE/DESERTIFICATION

184

PRAMANIK, S.K./HARIHARAN, P.S./GHOSE, S.K.

1953

ANALYSIS OF THE CLIMATE OF THE RAJASTHAN DESERT AND ITS EXTENSION. IN DESERT RESEARCH, PROCEEDINGS, INTERNATIONAL SYSPOSIUM HELD IN JERUSALEM, MAY 7-14, 1952.

RESEARCH COUNCIL OF ISRAEL, SPECIAL PUBLICATION 2:176-184.

DATA ARE PRESENTED TO SHOW THAT OVER THE RAJASTHAN DESERT AND ADJACENT AREAS THERE HAS BEEN NO APPRECIABLE CHANGE OF RAINFALL, MAXIMUM TEMPERATURE, MINIMUM TEMEPERATURE, HUMIDITY AND WINDS, DURING THE LAST 70 TO 80 YEARS. ANY EXTENSION OF DESERT CONDITIONS HAS NOT BEEN DUE TO METEOROLOGICAL FACTORS BUT IS THE RESULT OF OTHER CAUSES SUCH AS HUMAN INTERVENTION. IT WOULD THEREFORE PROBABLY BE POSSIBLE TO STOP FURTHER EXTENSION OF DESERT CONDITIONS AND ALSO PERHAPS TO RECLAIM SOME OF THE LAND BY ADOPTION OF SUITABLE METHODS OF LAND CONSERVATION AND RECLAMATION.

OALS/CLIMATOLOGY/ARID CLIMATE/ASIA/WEATHER DATA/CLIMATIC DATA/ METEOROLOGICAL DATA/DESERTIFICATION/RAJASTHAN DESERT/CLIMATIC CHANGE

185

PREGO, A.J. ET AL.

1971

STABILIZATION OF SAND DUNES IN THE SEMIARID ARGENTINE PAMPAS. IN W.G. MCGINNIES, B.J. GOLDMAN AND P. PAYLORE, EDS., FOOD, FIBER, AND THE ARID LANDS, P. 369-392.

UNIVERSITY OF ARIZONA PRESS, TUCSON. SWRA W72-03672.

APPROXIMATELY 75 PERCENT OF THE AREA OF ARGENTINA SUFFERS FROM ARIDITY, WHICH INTENSIFIES FROM EAST TO WEST. THE WORST PROBLEMS OF WIND EROSION AND SAND DUNE INSTABILITY OCCUR IN THE SEMIARID PAMPAS WHICH COMPRISES AN AREA OF ABOUT 22 MILLION HA. THIS REGION, BECAUSE OF GRAIN AND LIVESTOCK, IS ONE OF THE MOST IMPORTANT SOCIOECONOMIC REGIONS OF THE COUNTRY. RECORDS SHOW THAT THE IRREVERSIBLE DESTRUCTION OF FERTILE LANDS HAS BEEN EXTENSIVE AND SERIOUS, WITH SAND DUNES AS THE PERMANENT FOCI OF DESTRUCTION. AN ATTEMPT IS MADE TO DESCRIBE SYNTHETICALLY THE ENVIRONMENTAL CHARACTERISTICS, THE RESEARCH ACCOMPLISHED AND THE RESULTS ACHIEVED SINCE AN INTENSIVE RESEARCH EFFORT WAS BEGUN IN 1947. PASTURE ESTABLISHMENT IS MORE COMPLICATED THAN AFFORESTATION, BUT ACCOMPLISHES DUNE STABILIZATION IN ONLY 3-6 MONTHS WHILE TREES NEED 2-3 YEARS. (OALS)

OALS/ARGENTINA/SEMIARID CLIMATE/SAND CONTROL/EROSION CONTROL/SAND DUNES/SANDS/WIND ACTION/VEGETATION ESTABLISHMENT/GRASSES/AFFORESTATION /REFORESTATION/SEEDING/SALIX/JLMACEAE/EUCALYPTUS/DUNES

186

QALYOUBI, T.A.

1967

JAFER PILOT PROJECT FOR THE SETTLEMENT OF BEDOUINS. IN M.R. EL GHONEMY, ED., LAND POLICY IN THE NEAR EAST, P. 152-163.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME. WAERSA (10)64.

THE PLAN INITIATED IN 1963 WITH THE AID OF THE WORLD FOOD PROGRAMME TO IMPROVE SHEEP FARMING IN S. JORDAN WAS BASED ON THE THEORY THAT MIGRATION IS NOT A WAY OF LIFE FOR BEDOUINS BUT A MEANS OF LIVELIHOOD, AND THAT THE NOMAD-MIGRATORY SHEPHERD SYSTEM CAN BE TRANSFORMED INTO SETTLED AGRICULTURAL PATTERNS THROUGH EDUCATION AND TRAINING. THIS TRANSFORMATION IS A COMPLICATED OPERATION INVOLVING AGRO-ECONOMIC AND SOCIAL PROBLEMS. PROPER METHODS AND APPROPRIATE COLLECTION OF DATA AND OBSERVATIONS ARE EXTREMELY IMPORTANT FOR THE FINAL APPRAISAL OF THE RESULTS ACHIEVED. THE HUMAN ELEMENT, I.E., THE BEDOUINS AND THEIR PARTICIPATION IN THE ENDEAVOUR, IS VITAL TO ENSURE SUCCESS. ON-THE-JOB TRAINING THROUGH THE EMPLOYMENT OF NOMADS IN THE DEVELOPMENTAL STAGES OF SETTLEMENT IS ESSENTIAL TO ACQUIRE NEW SKILLS. THE FIXED INCOME THEY EARN IS NOT ONLY A STIMULANT FACTOR, BUT ALSO IS A VITAL REPLACEMENT OF THE MIGRATORY GRAZING SYSTEM FROM WHICH THEY TRADITIONALLY EARN THEIR LIVING. THE AGRICULTURAL PATTERNS TO BE EMPLOYED IN THE NEW SETTLEMENTS SHOULD TAKE INTO CONSIDERATION THE HABITS AND THE TRADITIONAL SKILLS OF THE BEDOUINS, I.E., LIVESTOCK RAISING WHICH HAS A VERY IMPORTANT ROLE TO PLAY BY PROVIDING THE BADLY NEEDED ANIMAL PROTEIN FOR THE PEOPLES OF THE REGION.

OALS/JORDAN/NOMADS/LAND RESOURCES/GRAZING/LIVESTOCK/SOCIAL ASPECTS/ HUMAN BEHAVIOR/LAND MANAGEMENT/MIDDLE EAST/SETTLEMENTS/ARABIAN DESERT/ ECONOMIC DEVELOPMENT

187

RAIKES, R.L.

1969

FORMATION OF DESERTS OF THE NEAR EAST AND NORTH AFRICA. CLIMATIC, TECTONIC, BIOTIC, AND HUMAN FACTORS. IN W.G. MCGINNIES AND B.J. GOLDMAN, EDS., ARID LANDS IN PERSPECTIVE, P. 147-154.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, WASHINGTON, D.C.; UNIVERSITY OF ARIZONA, TUCSON.

THE CONCEPT OF WEATHER FLUCTUATIONS OF RELATIVELY SHORT DURATION IS BASICALLY MORE SOUND IN MANY RESPECTS THAN IS THE MORE WIDELY ACCEPTED CLIMATE-CHANGE EXPLANATION AS THE CAUSE OF THE FORMATION OF DESERTS. THE IRREVERSIBILITY OF DROUGHT EFFECTS IN LOW-RAINFALL AREAS IS BOTH INEVITABLE AND MORE DESERT-CREATIVE, BECAUSE OF ITS GREATER SEVERITY, THAN THE GENERALLY POSTULATED SECULAR CLIMATIC CHANGE. WEATHER-INDUCED ECOLOGICAL CHANGE IS THE FUNDAMENTAL FACTOR IN THE CREATION OF DESERTS; IT IS THE INELUCTABLE BACKGROUND AGAINST WHICH THE ABUSE OF LAND AND ITS VEGETATION BY MAN AND ANIMALS ACTS ONLY AS A POSSIBLE ACCELERATOR. THE EFFECT OF TECTONICS IS RELATIVELY MINOR AND LOCALIZED. THE CHRONOLOGY OF DESERTS IS CONSIDERED ONLY FOR THE PERIOD-THE HOLOCENE-APPROXIMATELY DATABLE BY THE NORMAL ARCHEOLOGICAL

METHODS OF RELATIVE CHRONOLOGIES FIXED AT INTERVALS BY HISTORICAL OR ISOTOPE DATING. (AUTHOR)

OALS/DESERTIFICATION/MIDDLE EAST/AFRICA/SAHARA/DESERTS/CLIMATIC CHANGE/DROUGHTS/PERTURBATION/HOLOCENE EPOCH/WEATHER PATTERNS/ VEGETATION CHANGE

188

RAMASWAMY, C.

1968

MONSOON OVER THE INDUS VALLEY DURING THE HARAPPAN PERIOD.

NATURE 217:628-629. GA 69B/1760.

ARCHAEOLOGICAL EVIDENCE SHOWS THAT THE HARAPPANS, INHABITING IN THE INDUS VALLEY BETWEEN 2500 AND 1700 B.C. LIVED IN WETTER CLIMATIC CONDITIONS THAN EXIST THERE AT PRESENT. INTERMITTENT FLOODS WERE CHARACTERISTIC. METEOROLOGICAL CONSIDERATIONS SUPPORT THIS EVIDENCE OF FREQUENT ACTIVE MONSOON CONDITIONS OVER THE ENTIRE INDUS VALLEY WHICH THEN SUPPORTED DENSE VEGETATION. THESE CONCLUSIONS ARE FURTHER SUPPORTED BY A CARBON-14 DATE OF 5,000 B.P. WHICH HAS BEEN PLACED ON CONSIDERABLE SUPPLIES OF GROUND WATER FOUND IN THE ARID AREA OF WEST RAJASTHAN NEAR THE INDUS VALLEY.

WATER SUPPLY/OALS/INDUS BASIN/MONSOONS/PAKISTAN,WEST/RAJASTHAN/ CLIMATIC CHANGE/DESERTIFICATION/HISTORY/RADIOCARBON DATING/ ARCHAEOLOGY/VEGETATION CHANGE

189

RATHJENS, C.

1968

SOME IMPORTANT PRINCIPLES OF ANTHROPOGENIC GEOMORPHOLOGY IN ARID CLIMATES.

INTERNATIONAL GEOGRAPHICAL CONGRESS, 21ST, INDIA, 1968, ABSTRACTS OF PAPERS, P. 97.

THE AUTHOR BELIEVES DESICCATION IS MORE FREQUENTLY A CONSEQUENCE OF HUMAN ACTIVITIES THAN CLIMATIC CHANGE, AS MAN INFLUENCES VEGETATION, SOILS, AND THE HYDROLOGICAL BALANCE. EVEN GEOMORPHOLOGICAL PROCESSES, THOUGH NOT YET STUDIED IN DEPTH IN RELATION TO THE CONTRIBUTION OF IRRIGATION PRACTICES IN ARID AREAS, CAN BE AND ARE BEING SO CHANGED BY THESE HUMAN ACTIONS. HE DEMONSTRATES SOME OF THE PROBLEMS WITH EXAMPLES FROM THE THAR AND OTHER ARID AND SEMIARID AREAS.

OALS/THAR DESERT/GEOMORPHOLOGY/DESERTIFICATION/CLIMATIC CHANGE/ IRRIGATION PRACTICES

190

REED, C.A.

1964

A NATURAL HISTORY STUDY OF KURKUR OASIS, LIBYAN DESERT, WESTERN GOVERNATE, EGYPT.

POSTILLA 84. 20 P.

KURKUR OASIS LIES IN AN AREA OF CRETACEOUS TO EOCENE MARINE SEDIMENTS AND WAS APPARENTLY FORMED WHERE A WADI WAS ERODED FROM A PLATFORM THROUGH A SCARP ONTO A PLAIN. THE ORIGIN OF THE WATER IN THE OASIS IS DISCUSSED: LOCAL RAINFALL HELD BY AN IMPREVIOUS LAYER AT THE BOTTOM OF THE OASIS, THE PRESENCE OF A HIGH WATER TABLE, AND SPRINGS LYING ON TOP OF A FAULT LINE, THE WATER RISING FROM A DEEPER SOURCE THAN THE LOCAL WATER TABLE. ANY CONCLUSIONS MUST BE DERIVED IN TERMS OF THE TUFA DEPOSITED BY SPRINGS IN THE GEOLOGIC PAST. PERIODS OF DEPOSITION ALTERNATED WITH PERIODS OF DIMINISHED WATER SUPPLY. SUCH ALTERNATIONS MAY POSSIBLY BE CORRELATED WITH LOCAL CHANGES IN WATER SUPPLY OR WITH WORLDWIDE CLIMATIC CHANGES DURING THE QUATERNARY. THE OASIS IS NOT NOW INHABITED, THOUGH THERE IS EVIDENCE OF EARLY OCCUPANCY.

OALS/OASES/KURKUR OASIS/EGYPT/LIBYAN DESERT/CLIMATIC CHANGE/WATER SUPPLY/QUATERNARY PERIOD/DEPOSITION(SEDIMENTS)

191

REIFENBERG, A.

1950

MAN-MADE DUNE ENCROACHMENT ON ISRAEL S COAST.

INTERNATIONAL CONGRESS OF SOIL SCIENCE, 4TH, AMSTERDAM, 1950, 1:325-327.

DUNE ENCROACHMENT NEAR CAESAREA, COVERING 30 SQUARE KILOMETERS OF FERTILE SOIL, WAS CAUSED BY A MOLE OR MASONRY BREAKWATER ERECTED IN THE HARBOR IN ANTIQUITY.

OALS/ISRAEL/DUNES/DESERTIFICATION/COASTAL ENGINEERING

192

REIFENBERG, A.

1953

THE STRUGGLE BETWEEN DESERT AND THE SOWN. IN DESERT RESEARCH, PROCEEDINGS, INTERNATIONAL SYMPOSIUM HELD IN JERUSALEM, MAY 7-14, 1952.

RESEARCH COUNCIL OF ISRAEL, SPECIAL PUBLICATION 2:378-391.

DESERT CONDITIONS IN MANY PARTS OF ISRAEL ARE ATTRIBUTED TO ECOLOGICAL CAUSES AND HUMAN MISMANAGEMENT WHICH HAVE BROUGHT ABOUT A CONTINUING DETERIORATION OF NATURAL CONDITIONS. THERE HAS BEEN AN

ETERNAL STRUGGLE BETWEEN THE NOMAD AND PEASANT, BETWEEN DESERT AND CIVILIZATION. THE AUTHOR BELIEVES THAT WHENEVER THERE IS A DETERIORATION OF POLITICAL CONDITIONS, THE DESERT ENCROACHES CIVILIZED AREAS. THE NOMAD IS NOT SO MUCH THE SON OF THE DESERT, BUT ITS FATHER. ANOTHER ESSENTIAL FACTOR THAT CREATED STRESS IN THE AGRICULTURAL LIFE OF ALL MIDDLE-EASTERN STATES WAS THE PERPETUAL STRUGGLE BETWEEN THE INDEBTED SMALL CULTIVATOR AND THE LANDLORDS WHO DID NOT REPLENISH THE LAND. THE HISTORICAL REVIEW OF POLITICAL LAND MANAGEMENT DURING DIFFERENT TIME PERIODS INDICATES THAT TAXATION AND LAND MISUSE CONTRIBUTED TO DESICCATION OF SOIL AND VEGETATION. HISTORICAL PERIODS COVERED INCLUDE CA. 6000 B.C.--1917 A.D.

OALS/ISRAEL/CROP PRODUCTION/PRODUCTIVITY/NOMADS/SETTLEMENTS/POLITICAL ASPECTS/HUMAN RESOURCES/HISTORY/AGRICULTURE/DESICCATION/ DESERTIFICATION/SOIL EROSION/MIDDLE EAST/CLIMATOLOGY/LAND MANAGEMENT

193

REITAN, C.H./GREEN, C.R.

1968

APPRAISAL OF RESEARCH ON WEATHER AND CLIMATE OF DESERT ENVIRONMENTS. IN W.G. MCGINNIES, B.J. GOLDMAN, P. PAYLORE, EDS., DESERTS OF THE WORLD, P. 19-92.

UNIVERSITY OF ARIZONA PRESS, TUCSON. SWRA W69-09207.

THIS PAPER IS A SURVEY OF WHAT IS KNOWN ABOUT THE WEATHER AND CLIMATE OF THE DESERTS OF THE WORLD AND AN EVALUATION OF RESEARCH NEEDS. CLIMATIC BRIEFS ARE PRESENTED FOR THE MAJOR WORLD DESERTS. THESE INCLUDED MAJOR REFERENCES FOR CLIMATIC DATA AND FOR SYNOPTIC CLIMATOLOGY. DESERT STORMS AND UPPER-AIR CIRCULATIONS ARE EACH DISCUSSED. THE CONCEPT OF ARIDITY IS CONSIDERED IN RELATION TO THEORETICAL AND EMPIRICAL MEASUREMENTS OF WATER USE, OASIS EFFECT, POTENTIAL EVAPOTRANSPIRATION, CLASSIFICATION OF CLIMATE, INDICES OF ARIDITY, AND CLIMATIC ANALOGS. OTHER TOPICS TREATED ARE WEATHER MODIFICATION, MICROCLIMATE, RADIATION, BIBLIOGRAPHIES AND DEPOSITORIES. THE LACK OF A SATISFACTORY SYSTEM FOR DETERMINING WATER NEED AND WATER USE, AND FOR EXPRESSING ARIDITY IN THESE TERMS IS EMPHASIZED. THE EMPIRICAL EQUATIONS OF PENMAN AND BUDYKO ARE SUGGESTED TO BE THE MOST PRACTICAL METHODS OF ESTIMATING WATER NEED. IF ARIDITY AND QUANTITATIVE ESTIMATES OF WATER NEED ARE TO BE DEFINED AND DETERMINED IN TERMS OF THESE EQUATIONS, ORDINARILY UNAVAILABLE CLIMATOLOGICAL DATA SUCH AS RADIATION MEASUREMENTS, CLOUD COVER AND VAPOR PRESSURE WILL BE REQUIRED. MORE FIELD STUDIES ARE NEEDED TO DETERMINE THE VARIATIONS OF CLIMATE THAT OCCUR ON THE MICRO- AND MESO-SCALE OF DISTANCE. THE LEVEL OF CURRENT RESEARCH AND THE AUTHORITIES ARE DISCUSSED FOR EACH DESERT REGION OF THE WORLD. (OALS)

OALS/DESERTS/CLIMATIC DATA/WEATHER DATA/SYNOPTIC CLIMATOLOGY/ARIDITY/ WEATHER MODIFICATION/STORMS/PENMAN, H.L./BUDYKO, M.I./ PRECIPITATION(ATMOSPHERIC)/AIR CIRCULATION/ENVIRONMENTAL ENGINEERING

194

RINEY, T.A.

1971

WILDLIFE AND NOMADIC STOCKS IN SEMI-ARID LANDS.

LAND REFORM, LAND SETTLEMENT AND COOPERATIVES 1:27-37.

THE ENTIRE QUESTION OF NOMADS, WILDLIFE AND DRY LANDS IS ONLY ONE ASPECT OF THE VERY MUCH LARGER GLOBAL MATTER OF THE STABILIZATION OF THE MARGINAL LANDS OF THE WORLD, AND THEIR GRADUAL CONVERSION TO SOME FORM OF PRODUCTIVE USE. THE DESIRABILITY MUST BE CONSIDERED OF ARRESTING UNSATISFACTORY PRESENT FORMS OF USE AND OF SEARCHING FOR A VARIETY OF ALTERNATIVES. IN FUTURE, WILDLIFE MAY LARGELY REPLACE THE NOMADIC HERDS AND OTHER TYPES OF DOMESTIC ANIMAL USE ON THE DRY LANDS NOW UTILIZED MAINLY BY NOMADS. TECHNOLOGICALLY THERE IS COMPETENCE TO BRING ABOUT THESE CHANGES IN MANAGEMENT AND MARKETING, BUT TIME AND FURTHER RESEARCH ARE ESSENTIAL.

OALS/GRAZING/NOMADS/LAND RECLAMATION/LAND USE/WILDLIFE MANAGEMENT/ DESICCATION/ECONOMIC DEVELOPMENT/LIVESTOCK/SEMIARID CLIMATE

195

ROBBINS, L.H.

1972

ARCHEOLOGY IN THE TURKANA DISTRICT, KENYA.

SCIENCE 176(4033):359-366.

A REVIEW OF MAN S HISTORY IN THE AREA: EARLY MAN, THE DAWN OF TOOL MAKING, HAND AXES, ANCIENT OR RECENT; THE UPPER PLEISTOCENE, THE EARLY HOLOCENE, THE EMERGENCE OF FOOD PRODUCTION, THE STONE AGE-IRON AGE TRANSITION, THE RECENT PAST. JUDGING FROM PRESENT CONDITIONS AND THE PRESENT SCARCITY OF BIG GAME ANIMALS, TURKANA WOULD APPEAR TO HAVE BEEN A MARGINAL SUBSISTENCE AREA FOR STONE AGE HUNTER-GATHERERS OF IRON AGE AGRICULTURAL PEOPLES. HOWEVER, TURKANA HAS ONLY RECENTLY BECOME A DESERT. MUCH OF THE DETERIORATION OF THE LANDSCAPE IS DUE TO THE COMBINATION OF OVERGRAZING AND THE STRONG, DAILY WINDS THAT SWEEP BACK THE SAND FROM THE RETREATING SHORELINE OF LAKE RUDOLF.

CLIMATIC GEOMORPHOLOGY/OALS/EAST AFRICA/ARCHAEOLOGY/DESERTS/LAKES/ GRAZING/WIND ACTION/PERTURBATION/DEGENERATION/KENYA/TURKANA/ DESERTIFICATION

196

ROBERTS, B.R.

1965

APPLIED PLANT ECOLOGY IN LAND-USE PLANNING OF CATCHMENT AREAS.

SOUTH AFRICAN JOURNAL OF SCIENCE 61(3):111-117.

APPLICATION OF A SYNTHETIC ECOLOGICAL APPROACH TO WATERSHED PROBLEMS IS EXPLAINED IN RELATION TO THE IMPORTANCE OF CORRECT UTILIZATION OF

CATCHMENT AREAS IN SOUTH AFRICA. SPECIAL MENTION IS MADE OF THE DYNAMICS OF VELD MANAGEMENT IN SEMI-ARID CATCHMENTS AND IN PARTICULAR THE UPPER ORANGE RIVER CATCHMENT WHERE THE ENCROACHMENT OF THE KARROO CREATES FAR-REACHING PROBLEMS. OF ALL THE NATURAL FACTORS INFLUENCING RUN-OFF AND EROSION, VEGETATION IS THE ONLY FACTOR OVER WHICH MAN MAY EXERT ANY SIGNIFICANT INFLUENCE AND FOR THIS REASON THE IMPORTANCE OF THE MAINTENANCE OF AN EFFECTIVE VEGETATIVE COVER SHOULD NOT BE UNDERESTIMATED IN LAND-USE PLANNING OF GRASSLAND CATCHMENTS. SILT AND WATERSHED CONDITIONS OF THE UPPER ORANGE RIVER CATCHMENT AREA ARE COMPARED WITH OTHER SOUTH AFRICAN CATCHMENTS AND FUTURE CHANGES IN THE FORMER ARE DISCUSSED. POSITIVE SUGGESTIONS ARE MADE REGARDING IMPROVEMENTS. (AUTHOR)

OALS/EROSION/SOIL EROSION/VEGETATION EFFECTS/RANGE MANAGEMENT/ WATERSHED MANAGEMENT/SEMIARID CLIMATE/KARROO/CATCHMENTS/LAND USE/SOUTH AFRICA/DESERTIFICATION

197

RODD, F.

1938

THE SAHARA. (LETTER TO THE EDITOR)

GEOGRAPHICAL JOURNAL 91(4):354-355.

THE AUTHOR OFFERS SOME BRIEF COMMENTS ON STEBBING S BOOK, THE FORESTS OF WEST AFRICA AND THE SAHARA. HE QUESTIONS STEBBINGS HYPOTHESIS THAT DESERTIFICATION IS OCCURING ON THE FRINGES OF THE SAHARA AND EXPRESSES THE BELIEF THAT ALONG THE NORTHERN NIGERIAN BOUNDARY VEGETATION IS EXPANDING RATHER THAN RETREATING. HE BELIEVES THAT THE VARIABLE INCIDENCE OF RAINFALL AND CLIMATIC FLUCTUATIONS ARE RESPONSIBLE FOR STEBBING S OBSERVATIONS.

OALS/SAHARA/DESERTIFICATION/CLIMATIC CHANGE/NIGERIA/VEGETATION CHANGE

198

ROY, B.B./GUPTA, R.K./PANDEY, S.

1970

NATURAL RESOURCES AND THEIR DEVELOPMENT IN MAHENDRAGARH DISTRICT OF HARYANA STATE.

ANNALS OF ARID ZONE 9(2):65-76.

MAHENDRAGARH DISTRICT STRETCHES FROM LAT 27 DEGREES 47 MINUTES TO 28 DEGREES 49 MINUTES N, AND LONG. 75 DEGREES 49 MINUTES TO 76 DEGREES 28 MINUTES E, AN AREA OF ABOUT 3474 SQ KM., CONSISTING OF TWO BIO-CLIMATIC REGIONS, ARID AND SEMI-ARID. MAXIMUM TEMPERATURE OF 41-42 DEGREES C SOMETIMES RISING TO 47 DEGREES C IS RECORDED IN THE MONTHS OF MAY-JUNE, WHILE THE MINIMUM TEMPERATURE IS RECORDED IN DECEMBER-JANUARY. THE ANNUAL RAINFALL VARIES FROM 300 TO 500 MM. THE DESERTIC SOILS WITH SANDY TO LOAMY SAND TEXTURE ARE FOUND IN THE ARID PART, AND SIEROZEMS IN THE SEMI-ARID. THE MAIN PROBLEMS ARE SHIFTING SAND

DUNES, SEVERE WIND EROSION, DEGRADED PASTURES AND SCARCITY OF WATER. RECOMMENDATIONS FOR SOLVING THESE PROBLEMS HAVE BEEN MADE. (AUTHOR)

SEMIARID CLIMATE/OALS/INDIA/MAHENDRAGARH DISTRICT/DEGENERATION/WIND EROSION/SIEROZEMS/TEMPERATURE RANGES/ARID CLIMATE/NATURAL RESOURCES

199

ROY, B.B./PANDEY, S.

1970

EXPANSION OR CONTRACTION OF THE GREAT INDIAN DESERT.

NATIONAL ACADEMY OF SCIENCES OF INDIA, ALLAHABAD, PROCEEDINGS, SECTION B: BIOLOGICAL SCIENCES 36(6):331-344.

THE GREAT INDIAN DESERT, WHICH FORMS THE EASTERN LIMIT OF THE EXTENSIVE HOT DESERT REGION STRETCHING FROM THE WESTERN COAST OF AFRICA, IS MORE OR LESS METEOROLOGICALLY HOMOGENEOUS WITH IDENTICAL PHASES OF PHYSIOGRAPHICAL AND ANTHROPOGEOGRAPHICAL CONDITIONS. THIS DESERT WAS FORMED DUE TO THE ABSENCE OF MOIST MONSOON AIR AND ITS MECHANISM OVER THE AREA. WIDESPREAD RAINS OCCUR ONLY DURING THE MONSOON DEPRESSIONS PASSING OVER THIS REGION, BUT THE FREQUENCY OF SUCH DEPRESSIONS WAS ONLY 24 IN THE 70 YEARS, 1891-1960. EXAMINATION AND STUDY OF THE CLIMATOLOGICAL, GEOMORPHOLOGICAL, PEDOLOGICAL, HYDROLOGICAL, FLORISTIC, FAUNISTIC, AND CULTURAL EVIDENCES OF THE PAST AND PRESENT REVEAL THAT THE GREAT INDIAN DESERT HAS BEEN STATIONARY SINCE ITS FORMATION SOME TIME IN THE MID-MIOCENE PERIOD. ALTHOUGH SOME TEMPORARY MODIFICATIONS IN THE CLIMATE OF THE REGION MAY HAVE BEEN EXPERIENCED DURING THE GLACIAL PERIODS, THESE DID NOT APPRECIABLY AFFECT THE DESERT CONDITION. A CONSIDERATION OF THE ARGUMENTS FOR AND AGAINST EXPANSION OF THE DESERT AND POSSIBLE CAUSES FOR ITS ORIGIN INDICATES THAT THE DESERT IS NEITHER EXPANDING NOR CONTRACTING BUT HAS BEEN OCCUPYING ESSENTIALLY THE SAME POSITION OVER THE AGES. (OALS)

OALS/INDIAN DESERT/MOISTURE AVAILABILITY/METEOROLOGY/RAINFALL/DATA COLLECTIONS/MONSOONS/SEASONAL/CLIMATOLOGY/GEOMORPHOLOGY/SOILS/HYDROLOGY/PLANTS/ANIMALS/CULTURAL GEOGRAPHY/MIOCENE EPOCH/PALEOCLIMATOLOGY/PALEOGEOGRAPHY/CLIMATIC GEOMORPHOLOGY

200

RUSSELL, R.T./MARTIN, P.S.

1972

BEYOND BOS: LITERATURE OF GAME RANCHING (ESPECIALLY ELAND) AND THE NEW RANGE MANAGEMENT.

UNIVERSITY OF ARIZONA, DEPARTMENT OF GEOSCIENCES, TUCSON. 14 P. PROCESSED.

THE COMPILERS STATE THAT THIS BIBLIOGRAPHY WAS PUT TOGETHER TO HELP GUIDE RANGE MANAGERS AND ECOLOGISTS TO UNDERSTAND WHY EXOTIC LARGE MAMMALS MAY BE OF MORE VALUE THAN HAS BEEN PREVIOUSLY ACKNOWLEDGED. QUESTIONS OF ADAPTABILITY, SUITABILITY, AND MARKETABILITY EMERGE. IT IS NOT YET KNOWN IF AFRICAN GAME RANCHING TECHNIQUES CAN BE EXTENDED TO THE NEW WORLD, BUT IT IS KNOWN THAN MUCH PRIMARY PRODUCTIVITY

REMAINS UNHARVESTED BY HERBIVORES, A STATE OF AFFAIRS THAT WAS UNLIKELY DURING THE CENOZOIC EVOLUTION OF LARGE MAMMALS.

OALS/BIBLIOGRAPHIES/WILDLIFE MANAGEMENT/TAUROTRAGUS/MAMMALS/RANGE MANAGEMENT/ANIMAL ECOLOGY/INTRODUCED SPECIES/ADAPTATION/CARRYING CAPACITY/EAST AFRICA

201

ST. BARBE BAKER, R.

1966

SAHARA CONQUEST.

BUTTERWORTH PRESS, LONDON. 186 P.

THE AUTHOR CALLS FOR IMMEDIATE, CONCERTED EFFORTS TO RESTORE TO THE WORLD IN GENERAL, AND TO THE SAHARA IN PARTICULAR, THE ABUSED AND ABANDONED LAND. NATIONS MUST ADOPT AND ADAPT THE PRINCIPLES OF ECOLOGY IN DEALING WITH HUMAN PROBLEMS WHICH INCLUDE REAFFORESTATION AND THE REDUCTION OF OVER GRAZING PRACTICES. HIS INTRODUCTION OF THE IDEA OF COOPERATION ON A LARGE, INTERNATIONAL SCALE HAS STILL TO BE IMPLEMENTED BECAUSE OF POLITICAL CONSIDERATIONS THAT HAVE DELAYED EXECUTION OF THE IDEA. THE AUTHOR FEELS THAT WITH THE CORRECT TECHNOLOGY 2 MILLION SQUARE MILES OF THE SAHARA CAN BE RECLAIMED. THE PROBLEMS OF THE DESERTIFICATION OF THE SAHARA MAY BE REVIEWED IN TERMS OF WHAT HAPPENED IN THE U.S. AND CANADA TO FORM THE DUST BOWL, AND PREVENTIVE MEASURES MUST BE STUDIED. (OALS)

CONSUMPTIVE USE/OALS/REFORESTATION/GRAZING/ANIMAL DAMAGE/ DESERTIFICATION/LAND RECLAMATION/LAND MANAGEMENT/WATER RESOURCES/ WATER RESOURCES DEVELOPMENT/RESERVOIRS/PLANT COVER/DUNES/SAND CONTROL/ MICROENVIRONMENT /UNITED ARAB REPUBLIC/AFRICA/SAHARA/DESICCATION

202

ST. BARBE BAKER, R.

1969

THE SAHARA: AN EVER-PRESENT CHALLENGE.

UNASYLVA (FAO) 23(2):2-14. GA 700-1522.

TEN THOUSAND YEARS AGO THE SAHARA WAS APPARENTLY TEEMING WITH HUMAN, ANIMAL AND BIRD LIFE. THE AUTHOR REPORTS ON DEVELOPMENTS IN MOROCCO, ALGERIA, LIBYA, TUNISIA, EGYPT, ETHIOPIA, KENYA AND SUDAN TO REPLANT PARTS OF THE SAHARA AND TO HALT THE ADVANCE OF THE SANDS. A SECTION RECOUNTS THE WORK OF FAO IN SAHARA RECLAMATION.

ECOSYSTEMS/OALS/DESERTIFICATION/SAHARA/REFORESTATION /SAND CONTROL/ MOROCCO/ALGERIA/LIBYA/TUNISIA/EGYPT/ETHIOPIA/KENYA/SUDAN

203

SANDFORD, K.S.

1933

PAST CLIMATE AND EARLY MAN IN THE SOUTHERN LIBYAN DESERT.

GEOGRAPHICAL JOURNAL 82:219-222.

IN THE SOUTHERN LIBYAN DESERT VAST SANDSHEETS SEEM TO BE ANCIENT FEATURES, WHICH WERE GENERALLY SHUNNED BY PALEOLITHIC MAN. EARLY MAN WANDERED OVER MOST OF THE INTERVENING AREAS BETWEEN THE SAND SHEETS, BUT AS DESICCATION PROGRESSED RETREATED TO HIGH GROUND, TO THE SCARPS OF THE PERIMETER OF THE DESERT, AND TO THE NILE VALLEY. A VARIATION IN RAINFALL, PERHAPS IN NEOLITHIC TIME, ALLOWED WIDE AREAS TO BE RECOLONIZED, ONLY TO BE ABANDONED AGAIN. EVEN NOW, CERTAIN REMOTE DISTRICTS CAN BE WELL POPULATED FOR A FEW YEARS AFTER RAIN, AND THEN RETURN TO ABSOLUTE ARIDITY.

OALS/ARCHAEOLOGY/PALEOCLIMATOLOGY/SOCIAL ASPECTS/
PRECIPITATION(ATMOSPHERIC) /DROUGHTS/LIBYAN DESERT/SAND DESERTS/
DESERTIFICATION/DESICCATION/SUDAN/OASES

204

SAUER, C.O.

1955

THE AGENCY OF MAN ON THE EARTH. IN W.L. THOMAS, JR., ED., MAN S ROLE IN CHANGING THE FACE OF THE EARTH, P. 49-69.

UNIVERSITY OF CHICAGO PRESS, CHICAGO.

A REVIEW OF THE PROGRESSIVE INTENSITY OF MAN S ACTIVITIES IN ALTERING PREVIOUSLY ESTABLISHED ECOLOGICAL BALANCES. PLEISTOCENE AND POST PLEISTOCENE CLIMATE ARE EVALUATED, AND PROBLEMS OF DETERMINING PAST CLIMATES ARE OUTLINED. MAN S USE OF FIRE WAS GREAT, IN MAIN BEING RESPONSIBLE FOR THE ORIGIN AND PRESERVATION OF GRASSLANDS. THE ORIGIN OF PEASANT AND PASTORAL WAYS IS TRACED AND THE SPREAD OUTLINED. SHIFTING AGRICULTURE HAS SEVERAL BENEFITS, ECOLOGICALLY, OVER PLOW AGRICULTURE. AS FOR DESERTIFICATION IN NORTH AFRICA, THE AUTHOR DOUBTS CHANGES IN THE PATTERN OF ATMOSPHERE CIRCULATION WITHIN THE TIME OF AGRICULTURE AND PASTORAL OCCUPATION. LARGELY, AND POSSIBLY WHOLLY, THE DETERIORATION OF THE BORDERS OF THE DRY LANDS MAY HAVE BEEN CAUSED BY ADVERSE, CUMULATIVE EFFECTS OF MAN S ACTIVITIES. DESERTIFICATION OF PARTS OF THE NAVAJO INDIAN RESERVATION BY OVERGRAZING OF SHEEP IS A SIGN THAT THE NEW WORLD COULD FOLLOW THE OLD IF OVERGRAZING IS INTENSIFIED BY DROUGHTS. THE COLONIZATION OF THE NEW WORLD IS TRACED, BOTH IN NORTH AMERICA AND LATIN AMERICA. EFFECTS OF SUCH CROPS AS TOBACCO AND COTTON HAVE BEEN GREAT. NEEDS FOR LAND AND TIMBER HAVE SPREAD THE EFFECTS OF CHANGE. THE AUTHOR SUGGESTS THAT MODERN TECHNOLOGICAL SOCIETY IS IN AN ECOLOGICALLY PRECARIOUS POSITION AND THREATENS TO SUBVERT THE SO CALLED UNDERDEVELOPED COUNTRIES INTO THE SAME POSITION.

OALS/ARID LANDS/SOCIAL ASPECTS/AGRICULTURE/GRAZING/DOMESTIC ANIMALS/
ENVIRONMENTAL EFFECTS/GRASSLANDS/HUMANS/BURNING/CULTURAL GEOGRAPHY/
SOIL EROSION /NORTH AFRICA/NORTH AMERICA/HISTORY/PALEOCLIMATOLOGY/
BIOGEOGRAPHY/DESERTIFICATION/SOUTH AMERICA/PERTURBATION

205

SCHAMP, H.

1967

KHARGA, VON DER OASIS MAGNA ZUM NEUEN TAL (KHARGA, FROM THE OASIS MAGNA TO THE NEW VALLEY).

ERDE 98(3):173-202. SWRA W70-04412.

KHARGA, ONE OF THE LARGEST OF THE EGYPTIAN OASES, WAS INCLUDED IN THE AREA OF THE WESTERN DESERT SELECTED BY EGYPTIAN GOVERNMENT S GENERAL DESERT DEVELOPMENT ORGANIZATION FOR LAND RECLAMATION AND RESETTLEMENT. THE FIRST 5-YEAR PROGRAM (1960-1965) PROVIDED APPROXIMATELY 100 DEEP WELLS, FURNISHING IRRIGATION WATER FOR THE CULTIVATION OF SOME 45,000 FEDDANS (1 FEDDAN= 1.04 ACRES) AS COMPARED WITH ONLY 6,000 FORMERLY. ALTHOUGH THE ORIGIN OF THE GROUNDWATER IN THE KHARGA OASIS AREA IS NOT YET IDENTIFIED, CURRENT ESTIMATES FROM KNOWN SUPPLIES INDICATE THAT EVEN LARGER ACREAGE MAY BE BROUGHT UNDER CULTIVATION. TOPICS DISCUSSED INCLUDE GROUNDWATER, SOILS, A HISTORY OF THE OASIS DETAILING RECURRING DESERTIFICATION, THE COST OF FINANCING THE NEW VALLEY PROJECT, AND SETTLEMENT PROBLEMS. THE LATTER TOPIC SEEKS TO COMPARE THE OLD OASIS VILLAGES WITH THE NEW SETTLEMENTS, CHARACTERIZED BY AN INFLUX OF NEW POPULATION TYPES: TECHNICIANS, ENGINEERS, AND THE LIKE. THE EXTREME DESERTIC CONDITIONS OF THE SURROUNDING ENVIRONMENT MAKE THE KHARGA OASIS DEVELOPMENT ONE OF GREAT GENERAL INTEREST, SINCE ITS SUCCESS COULD PROVIDE A PILOT FOR SIMILAR WATER-SHORT AREAS THROUGHOUT THE ARID WORLD. THE ELEMENT OF ITS WATER POTENTIAL IS THE CRITICAL FACTOR. (OALS)

IRRIGATION PROGRAMS/DESERTS/EGYPT/OASES/WATER RESOURCES DEVELOPMENT/ GROUNDWATER BASINS/WELLS/SOCIAL ASPECTS/WESTERN DESERT/ECONOMIC DEVELOPMENT/LAND RECLAMATION/SAHARA/KHARGA OASIS/OALS

206

SCHULMAN, E.

1938

NINETEEN CENTURIES OF RAINFALL HISTORY IN THE SOUTHWEST.

AMERICAN METEOROLOGICAL SOCIETY, BULLETIN 19:211-215.

THE USE OF TIMBERS BY THE PUEBLO INDIANS OF THE SOUTHWEST FOR BUILDING PURPOSES MADE POSSIBLE THE EXTENSION OF THE COLORADO PLATEAU CHRONOLOGY INTO PRE-HISTORIC TIMES. TREE RING GROWTH PATTERNS FROM VARIOUS RUINS HAVE BEEN CROSS REFERENCED. CENTRAL PUEBLO CHRONOLOGY IS DISCUSSED IN SEVERAL INTERVALS, EACH ENDING OR BEGINNING WITH A SEVERE DROUGHT. IT APPEARS LIKELY THAT NO SUBSTANTIAL SECULAR CHANGE IN CLIMATE HAS TAKEN PLACE DURING THE LAST NINETEEN CENTURIES IN THIS REGION. AN EXTENSIVE FOREST WAS PROBABLY REMOVED FROM THE CHACO CANYON, NEW MEXICO AREA ABOUT THE 10TH CENTURY. REESTABLISHMENT WAS PREVENTED BY LOSS OF SOIL DUE TO EROSION.

PRECIPITATION(ATMOSPHERIC)/OALS/ARCHAEOLOGY/PALEOCLIMATOLOGY/TREES/ DENDROCHRONOLOGY/CLIMATOLOGY/NEW MEXICO/SOUTHWEST U.S./COLORADO PLATEAU/HISTORY/CLIMATIC CHANGE/DESERTIFICATION

207

SEARS, P.B.

1958

ENVIRONMENT AND CULTURE IN RETROSPECT. IN T.L. SMILEY, ED., CLIMATE AND MAN IN THE SOUTHWEST, A SYMPOSIUM HELD BEFORE THE THIRTY-THIRD ANNUAL MEETING OF THE SOUTHWESTERN AND ROCKY MOUNTAIN DIVISION OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, APRIL 30TH, 1957, TUCSON, ARIZONA, P 77-84

UNIVERSITY OF ARIZONA PRESS, TUCSON, ARIZONA.

THE AUTHOR FEELS THAT ARID REGIONS OF LOW RAINFALL AND HIGH EVAPORATION, COMPRISING AT LEAST 35 PERCENT OF THE EARTH S SURFACE, ARE UNDER CONSTANTLY INCREASING PRESSURE FROM MAN. EARLIER CULTURES IN ANCIENT TIMES, BY TRIAL AND ERROR, WORKED OUT EMPIRICALLY A MORE RATIONAL AND SUSTAINING PATTERN OF WATER USE THAN IS CURRENTLY BEING DEVELOPED. EVIDENCES OF MAN S ACTIVITY ARE SCARCE DUE TO EROSION OF THE OLD MARGINS AND SURFACE SLOPES. INCLUDED IS A TABLE DEFINING CHARACTERISTICS OF CULTURE AND CLIMATE, AS WELL AS DATES AND GENERAL GEOLOGIC FEATURES OF DIFFERENT TIME PERIODS. SEVEN REFERENCES. (OALS)

WATER UTILIZATION/OALS/SETTLEMENTS/SOUTHWEST U.S./ARIZONA/CLIMATIC CHANGE/ARID CLIMATE/PERTURBATION/DESICCATION /ENVIRONMENTAL EFFECTS/ ADAPTATION/DESERTIFICATION

208

SEARS, P.B.

1959

DESERTS ON THE MARCH. 3RD ED., REV.

UNIVERSITY OF OKLAHOMA PRESS, NORMAN. 178 P.

THIS POPULAR ACCOUNT OF MAN S MISUSE OF THE LAND AND FAILURE TO UNDERSTAND ITS ECOLOGY CENTERS AROUND THE HISTORICAL DEVELOPMENT OF LAND USE IN THE UNITED STATES. THE CUTTING OF FOREST, FARMING OF COTTON, PLOWING OF PRAIRIES, POLLUTING OF RIVERS, OVERGRAZING AND GENERAL DISREGARD FOR THE WELFARE OF THE LAND ARE SHOWN TO BE RELATED TO FLOODS, MUDSLIDES, DUST STORMS, EROSION AND OTHER NATURAL CALAMITIES. THE AUTHOR ARGUES THAT ONLY THROUGH A BROAD ECOLOGICAL UNDERSTANDING OF THE ENVIRONMENT AND MAN S RELATIONSHIP TO IT COUPLED WITH MORAL COMMITMENT IN THE EMPLOYMENT OF TECHNICAL RESOURCES AND IN OUR WAY OF LIVING WILL WE BE ABLE TO CHANGE OUR HISTORIC PRECEDENTS.

OALS/EROSION/NATURAL RESOURCES/ECOLOGY/DROUGHTS/HISTORY/CONSERVATION/ LAND RESOURCES/LAND USE/DUST STORMS/FLOODS/PERTURBATION/DEGENERATION/ ENVIRONMENTAL EFFECTS

209

SEMMEL, A.

1971

ZUR JUNGQUARTAREN KLIMA- UND RELIEFENTWICKLUNG IN DER DANAKILWUSTE (ATHIOPIEN) UND IHREN WESTLICHEN RANDGEBIETEN (EARLY QUATERNARY CLIMATE AND RELIEF DEVELOPMENT IN THE DANAKIL DESERT OF ETHIOPIA AND ITS WESTERN EDGES).

ERDKUNDE 25(3):199-209. GA 72A-1196.

WEATHERING AND EROSION PROCESSES, TYPICAL OF ARID AREAS, ARE CURRENTLY DOMINANT IN THE DANAKIL DESERT. AT THE SAME TIME THERE ARE TRACES OF A ONCE MOISTER CLIMATE, SHOWN MAINLY BY FOSSIL SOILS (LATOSOLS AND TIRS) AND HUMUS--RICH SILTS WHICH DO NOT COME FROM THE DAMP HIGHLAND AREA. CARBON 14 DATINGS OF THESE FORMATIONS AND OF GASTROPOD SHELLS FOUND ON HIGH-LYING SEASHORES INDICATE A MIDDLE TO LATE HOLOCENE AGE. A SIMILAR CARBON 14 AGE IS POSSESSED BY HUMUS--RICH DEPOSITS IN COARSE GRAVEL ACCUMULATIONS IN THE WESTERN HIGHLAND. ON THE ASSUMPTION THAT THE CARBON 14 DATES AT LEAST APPROXIMATE THE REAL AGE, THE CONCLUSION CAN BE DRAWN THAT THIS MOISTER TIME PERIOD CANNOT BE FULLY REGARDED AS PARALLEL TO A PHASE OF THE LAST CENTRAL EUROPEAN ICE AGE (WURM). 56 REFERENCES.

OALS/WEATHERING/EROSION/ARID LANDS/DANAKIL/PALEOCLIMATOLOGY /SOIL PHYSICAL PROPERTIES /RADIOCARBON DATING/HOLOCENE EPOCH/GEOLOGICAL SEDIMENTATION /GLACIAL DRIFT/SOIL TEXTURE/QUATERNARY PERIOD

210

SHALEM, N.

1953

LA STABILITE DU CLIMAT EN PALESTINE. IN DESERT RESEARCH, PROCEEDINGS, INTERNATIONAL SYMPOSIUM HELD IN JERUSALEM, MAY 7-14,1952.

RESEARCH COUNCIL OF ISRAEL, SPECIAL PUBLICATION 2:153-175.

CLIMATE, HYDROLOGY, BIOLOGY AND HISTORIC SETTLEMENT PATTERNS AND CHANGES ARE TRACED. THE AUTHOR REJECTS THE THEORY THAT POPULATION CHANGES IN THE AREA WERE CAUSED BY CLIMATIC CHANGE, IN FAVOR OF ONE THAT ATTRIBUTES THESE CHANGES TO HUMAN INFLUENCES.

OALS/ARID CLIMATE/REGIONAL ANALYSIS/HISTORY/SETTLEMENTS/MIDDLE EAST/ HYDROLOGY/BIOGEOGRAPHY/CLIMATIC CHANGE/PALESTINE/DESERTIFICATION

211

SIMONS, M.

1967

DESERTS, THE PROBLEM OF WATER IN ARID LANDS.

OXFORD UNIVERISTY PRESS, LONDON. 96 P. MGA 21.1-17. SWRA W70-02561.

AN EXTENSIVE AND WELL-ILLUSTRATED OVERVIEW OF DESERT CLIMATE, PLANTS, AND ANIMALS, WITH THE MAIN EMPHASIS ON SOURCES OF WATER: GROUNDWATER, WATER TRANSFER, DESALINATION, WEATHER MODIFICATION TO INCREASE RAINFALL. THE QUESTION IS RAISED CONCERNING THE ECONOMIC EFFICIENCY IN COMMITTING WATER DEVELOPMENTS IN ARID LANDS TO IRRIGATION RATHER THAN TO ALTERNATIVE USES. INCLUDED IS AN APPENDIX DESCRIBING THE KOEPPEN CLASSIFICATION OF DESERT CLIMATES, WITH EXAMPLES OF ITS APPLICATION. (OALS)

OALS/DESERTS/WEATHER MODIFICATION/DESALINATION/WATER TRANSFER/ GROUNDWATER/WATER SOURCES/KOEPPENS CLIMATIC CLASSIFICATION/CLIMATE/ DESERT PLANTS/DESERT ANIMALS/IRRIGATION WATER/WATER UTILIZATION/ ENVIRONMENTAL ENGINEERING/WATER RESOURCES DEVELOPMENT

212

SMITH, H.T.U.

1963

EOLIAN GEOMORPHOLOGY, WIND DIRECTION, AND CLIMATIC CHANGE IN NORTH AFRICA, FINAL REPORT.

U.S. AIR FORCE, CAMBRIDGE RESEARCH LABORATORIES, CONTRACT NO. AF 19(628)-298. AFCRL 63 443. 48 P. AVAILABLE NTIS AS AD-405 144.

THE NORTH AFRICAN DESERT BELT IS A REGION OF TEMPERATURE EXTREMES, STRONG WINDS, AND NEGLIGIBLE RAINFALL. WIND ACTION HAS BEEN A MAJOR GEOLOGIC PROCESS. EROSIONAL EFFECTS COMPRISE ENCLOSED BASINS AND VARIOUS RESIDUAL ROCK KNOBS AND RIDGES, COMMONLY ELONGATED PARALLEL TO DOMINANT WIND DIRECTION. DEPOSITIONAL EFFECTS COMPRISE SAND STREAMERS, DRIFTS, AND DUNES. ACTIVE DUNES MAY BE CLASSED AS SIMPLE, COMPOUND, AND COMPLEX. COMPOUND DUNES COMPRISE BARCHAN, TRANSVERSE, AND LONGITUDINAL TYPES, AND ARE TRANSITIONAL INTO SIMPLE TYPES ON THE ONE HAND, AND COMPLEX TYPES ON THE OTHER. COMPLEX DUNES ARE THE MOST WIDESPREAD, AND SHOW EXTREME DIVERSITY IN CHARACTER. THEY MAY BE GROUPED AS LONGITUDINAL, PEAKED, DOMAL, RIDGED, AND UNDIFFERENTIATED. THEY ARE BELIEVED TO HAVE BEEN FORMED BY DIVERGENT WINDS, AND TO HAVE HAD A COMPLICATED DEVELOPMENT HISTORY. STABILIZED OR FOSSIL DUNES OCCUR IN A BROAD BELT BORDERING THE SAHARA ON THE SOUTH, AND REPRESENT A FORMER EXPANSION OR SHIFT OF THE DESERT BELT.

OALS/NORTH AFRICA/GEOMORPHOLOGY/SAND DUNES/DESERTS/DUNES/EOLIAN SOILS /TEMPERATURE RANGES/WIND ACTION/CLIMATIC GEOMORPHOLOGY/SAHARA/CLIMATIC CHANGE

213

STEBBING, E.P.

1935

THE ENCROACHING SAHARA.

GEOGRAPHICAL JOURNAL 85(6):506-524.

DESCRIBES CONDITIONS OF THE VEGETATION ALONG THE SOUTHERN BORDER OF THE SAHARA: THE IVORY COAST, NIGERIA, NIGER, AND SUDAN. THE BELIEF IS EXPRESSED THAT THE SAHARA DESERT IS MOVING SOUTHWARD AND HISTORICAL EVIDENCE CITED TO SUPPORT THIS IDEA THAT DURING THE LAST SEVERAL HUNDRED YEARS THE DESERT HAS INVADED PREVIOUSLY PRODUCTIVE AREAS. THIS IS ATTRIBUTABLE, IN PART AT LEAST, TO PRACTICES OF SHIFTING AGRICULTURE AND OVERGRAZING. THE AUTHOR RECOMMENDS THE CREATION OF TWO INTERNATIONAL BELTS OF FORESTED AREAS TO THWART THE ADVANCE OF THE DESERT.

OALS/SAHARA/NIGERIA/NIGER/SUDAN/DESERTIFICATION/GRAZING/PERTURBATION/LAND USE/VEGETATION CHANGE

214

STEBBING, E.P.

1937

THE THREAT OF THE SAHARA.

ROYAL AFRICAN SOCIETY, JOURNAL 36. 36 P.

REVIEWS OBSERVATIONS OF GEOLOGISTS, HISTORIANS, FORESTERS, POLITICAL ADMINISTRATORS AND OTHERS ON DESERTIFICATION IN THE SAHARA, ADDING TO THESE OBSERVATIONS FROM EXTENSIVE TRAVEL. EVIDENCE IS PRESENTED TO SHOW THAT MANY AREAS WHICH TODAY ARE DESERT WERE PREVIOUSLY FORESTED. ALSO, THE FALLING OF WATER LEVELS AND RESULTANT LOSS OF VEGETATION, RIVERS AND WATER HOLES, IS RELATED TO THE GENERAL DESERTIFICATION OF THE AREA. A SHORT HISTORY OF CIVILIZATIONS PREVIOUSLY INHABITING THE AREA DEMONSTRATES THE HIGHER PRODUCTIVE CAPACITY OF THE AREA IN ANCIENT TIMES. THE ARGUMENTS SURROUNDING DESICCATION OF THESE AREAS AND MAN S ROLE IN IT ARE TREATED. WARS, OVERUTILIZATION OF THE SOILS BY PRIMITIVE METHODS OF AGRICULTURE, EXCESSIVE GRAZING AND PASTURAGE, AND PERHAPS MOST IMPORTANT OF ALL, FIRE ARE CONSIDERED THE MAJOR CAUSES IN THE SPREAD OF THE DESERT. PRESENT DAY CONDITIONS ARE EXAMINED IN WEST AFRICA. DEGRADATION OF FOREST INTO TRUE SAVANNA IS RESULTING FROM SLASH AND BURN AGRICULTURE FOLLOWED BY INTENSIVE GRAZING OF CATTLE, SHEEP AND GOATS. SAVANNA IS FURTHER DEGRADED BY NOMADIC GOAT HERDERS, RESULTING IN THE FINAL STAGES OF DESERT FORMATION.

OALS/SAHARA/DESERTIFICATION/DESICCATION/PERTURBATION/GRAZING/BURNING/DEGENERATION/SAVANNA/VEGETATION CHANGE

215

STEBBING, E.P.

1938a

AFRICA AND ITS INTERMITTENT RAINFALL: THE ROLE OF THE SAVANNAH FOREST.

ROYAL AFRICAN SOCIETY, JOURNAL 37 (SUPPL.). 32 P.

REVIEWS GEOGRAPHIC FACTORS INVOLVED IN DESICCATION, TREATING CRITICALLY THE EXPLANATION OF CLIMATIC PULSATIONS IN RELATION TO AFRICA AND TO THE SPREAD OF THE MONGOL PEOPLE. IN PAST TIMES, SMALL DESERT POPULATIONS COULD MOVE ABOUT TO BETTER GRAZING SITES AS THE SOIL BECAME DEGRADED, BUT RISING POPULATIONS IN MODERN TIMES HAVE SO DEPLETED SOIL AND WATER RESOURCES AS TO MAKE NATURAL RECOVERY OF THE LAND DIFFICULT IF NOT IMPOSSIBLE. THE AUTHOR BELIEVES THAT THE SAVANNA FORESTS ARE REMNANTS OF PREVIOUSLY CLOSED CANOPY FORESTS DEGRADED BY FIRE AND MAN S ACTIVITIES. HE PROPOSES FORMATION OF RESERVATIONS OF EXTENSIVE SAVANNA AREAS WITH SHIFTING AGRICULTURE, GRAZING, AND BURNING PROHIBITED. IN MORE DENSELY SETTLED AREAS, FARMING AND GRAZING COULD BE PERMITTED ON A ROTATING BASIS.

OALS/AFRICA/DESICCATION/SAVANNA/DESERTIFICATION/EROSION/DEGENERATION/PERTURBATION/LAND MANAGEMENT/NATURAL RESOURCES/VEGETATION CHANGE

216

STEBBING, E.P.

1938b

MAN-MADE DESERT IN AFRICA: EROSION AND DROUGHT.

ROYAL AFRICAN SOCIETY, JOURNAL 37 (SUPPL.). 40 P.

TREATS SOIL EROSION AS RELATED TO AFRICAN DESERTS UNDER: SHEET EROSION, SOIL EROSION DUE TO OVER-CULTIVATION, SOIL EROSION DUE TO EXCESS PASTURING, SOIL DETERIORATION, SAND INVASION OR PENETRATION, DESICCATION, SOIL DENUDATION, AND GULLY EROSION. DESERTIFICATION BY HUMAN ACTIVITIES IS BROUGHT ABOUT BY OVER-EXPLOITATION RELATED TO AGRICULTURE, WHICH THEN MAKES THE LAND SUITABLE ONLY FOR GRAZING, FOLLOWED BY OVERGRAZING, AND FINALLY IRREVERSIBLE CHANGE IN THE DIRECTION OF DESERTIFICATION. SUGGESTIONS TO HALT THIS DESTRUCTIVE PROCESS INCLUDE ENFORCEMENT OF STRICT REGULATIONS ON BURNING, REGULATION ON SHIFTING CULTIVATION AND GRAZING PRACTICES, A STUDY OF DECREASING WATER SUPPLIES, AND IMPLEMENTATION OF THESE PRACTICES TO RESTORE AREAS SUFFERING FROM INTERMITTENT RAINFALL BEFORE IRREVERSIBLE DESERTIFICATION TAKES PLACE.

OALS/DESERTIFICATION/EROSION/SOIL EROSION/GULLY EROSION/SHEET EROSION/DESICCATION/GRAZING/AFRICA/BURNING/DEGENERATION/PERTURBATION/DROUGHTS/VEGETATION CHANGE

217

STEBBING, E.P.

1938a

THE SAHARA; THE ADVANCE OF THE SAHARA [LETTER TO THE EDITOR].

GEOGRAPHICAL JOURNAL 91(4):356-359.

IN THIS ARTICLE THE AUTHOR DEFENDS HIS VIEWS OF INCREASING DESERTIFICATION IN THE SAHARA AGAINST SEVERAL CRITICAL REVIEWS OF HIS BOOK, THE FORESTS OF WEST AFRICA AND THE SAHARA. HE MAINTAINS THAT HUMAN ACTIVITIES OF SHIFTING AGRICULTURE AND OVER-GRAZING RESULT IN SOIL EROSION AND CLIMATIC CHANGE BRINGING ON DESERT-LIKE CONDITIONS TO PREVIOUSLY FORESTED AREAS.

OALS/DESERTIFICATION/SAHARA/PERTURBATION/GRAZING/SOIL EROSION/ CLIMATIC CHANGE/VEGETATION CHANGE

218

STEBBING, E.P.

1954

FORESTS, ARIDITY AND DESERTS. IN J.L. CLOUDSLEY-THOMPSON ED., BIOLOGY OF DESERTS. THE PROCEEDINGS OF A SYMPOSIUM ON THE BIOLOGY OF HOT AND COLD DESERTS. P. 123-128.

INSTITUTE OF BIOLOGY, LONDON.

THE AUTHOR IS CONCERNED WITH MAN S INFLUENCE ON THE CREATION OF DESERTS. SHIFTING CULTIVATION, AN IMPORTANT CAUSE OF THE DESTRUCTION OF FORESTS, ALLOWS FOR CULTIVATION FOR A FEW YEARS, BUT EVENTUALLY A DENSE WEED GROWTH SUPERVENES AND/OR THE SOIL DECREASES IN FERTILITY MAKING THE LAND UNUSABLE. THE SHIFTING CULTIVATOR THEN MOVES ON AND REPEATS THE OPERATION IN ANOTHER PART OF THE FOREST. WITH THE WORLDWIDE INCREASE IN POPULATION AND IN THE INTENSITY OF THE MISUSE OF SOIL AND DECREASING WATER SUPPLIES, MIGRATION FROM AN EXHAUSTED AREA LEAVES THE SOIL EXPOSED TO THE NATURAL PROCESSES OF EROSION. MODERN DEVELOPMENTS WHICH AIDED IN THE CREATION OF THE DUST BOWLS IN THE UNITED STATES AND CANADA WITH LITTLE MORE THAN HALF A CENTURY HELP FROM MAN, MUST BE EVALUATED. OTHER CAUSES OF DESERTIFICATION INCLUDE FIRE, INCREASED POPULATIONS, CLIMATIC CHANGE, DESTRUCTION OF SOIL, DESICCATION, AND INTERMITTENT STAGES OF RAINFALL THAT COMBINED WITH MODERN TECHNOLOGY TO AID MAN IN HIS DESTRUCTION OF ARABLE LANDS. THE AUTHOR RECOMMENDS THAT STEPS BE TAKEN IMMEDIATELY TO STOP FURTHER DEGRADATION OF LAND TO HALT THE MARCH OF THE DESERTS. (OALS)

OALS/DESERTIFICATION/LAND USE/EROSION/DROUGHTS/MOISTURE DEFICIT/ SETTLEMENTS/ARIDITY /PERTURBATION/DEGENERATION/NOMADS/SOIL EROSION/ DESICCATION/CROP PRODUCTION/SOCIAL ASPECTS

219

TANNEHILL, I.R.

1947

DROUGHT, ITS CAUSES AND EFFECTS.

PRINCETON UNIVERSITY PRESS, PRINCETON.

SEMI-POPULAR TREATMENT OF DROUGHTS: RELATING HISTORY IN THE UNITED STATES AND WORLDWIDE. MUCH OF THE BOOK IS DEVOTED TO EXPLANATION OF GENERAL CLIMATOLOGICAL THEORY AND ITS RELATIONSHIP TO DROUGHTS.

OALS/DROUGHTS/PRECIPITATION(ATMOSPHERIC)/RAINFALL/METEOROLOGY/ CLIMATOLOGY

220

THOMAS, H.E. ET AL

1963

DROUGHT IN THE SOUTHWEST, 1942-1956.

U.S. GEOLOGICAL SURVEY, PROFESSIONAL PAPER 372.

THIS COMPREHENSIVE STUDY IS ISSUED IN 7 PARTS AND A GENERAL SUMMARY (372A-H), COVERING IN DETAIL THE METEOROLOGIC PHENOMENON, AND EFFECTS OF DROUGHT ON WATER RESOURCES (CENTRAL AND SOUTH TEXAS, THE RIO GRANDE BASIN, BASINS OF INTERIOR DRAINAGE, COLORADO RIVER BASIN, AND THE PACIFIC COAST IN CALIFORNIA). THE SUMMARY CLASSIFIES HYDROLOGIC UNITS ACCORDING TO TYPE, WITH EXAMPLES. BASED ON ANALYSIS OF LONGEST RECORDS AVAILABLE CONCERNING ALL ASPECTS OF THE REGION S WATER RESOURCES, IT PAYS SPECIAL ATTENTION TO THE PERIOD 1942-1956 TO ASCERTAIN SIMILARITIES WITH EARLIER DROUGHT PERIODS AND CONTRASTS WITH PERIODS OF GREATER PRECIPITATION. THE DEFINITION OF DROUGHT USED IS THAT IT IS A METEOROLOGICAL PHENOMENON AND OCCURS DURING A PERIOD WHEN PRECIPITATION IS SIGNIFICANTLY LESS THAN THE LONG-TERM AVERAGE AND WHEN THIS DEFICIENCY IS GREAT ENOUGH AND CONTINUES LONG ENOUGH TO AFFECT MANKIND. WITHIN THIS UNDERSTANDING, EFFECTS OF DROUGHT ARE DISTINGUISHED FROM WATER SHORTAGES DUE TO OTHER CAUSES.

OALS/DROUGHTS/METEOROLOGICAL DATA/ARID LANDS/ARID CLIMATE/SEMIARID CLIMATE/WATER STORAGE/HYDROLOGIC DATA/WATER SOURCES/SOUTHWEST U.S.

221

THOMPSON, K.

1961

RIPARIAN FORESTS OF THE SACRAMENTO VALLEY, CALIFORNIA.

ASSOCIATION OF AMERICAN GEOGRAPHERS, ANNALS 51:294-315.

MOST OF THE VALLEY WILL NOT NOW SUPPORT TREES DUE TO THE EDAPHIC AND BIOTIC CONDITIONS, BUT QUERCUS LOBATA, PLANTANUS RACEMOSA, COTTONWOOD, AND WILLOW USED TO GROW ALONG THE WATER COURSES. THESE TREES GREW HERE DUE TO SUB-IRRIGATION, FERTILE ALLUVIAL LOAM SOILS, AND RELATIVE

FREEDOM FROM SURFACE WATERLOGGING AND FIRE. THEY SERVED TO REINFORCE THE RIVER BANKS, PROVIDED STREAM CHANNEL STABILITY, ACTED AS WINDBREAKS, REDUCED EVAPORATION, TRANSPIRATION, AND WIND DAMAGE, AND PROVIDED WILDLIFE HABITAT. THE WOODS WERE DESTROYED BY ANGLO AMERICANS IN ORDER TO USE THE LAND FOR OTHER PURPOSES. (OALS)

OALS/WGM/RIPARIAN VEGETATION/CALIFORNIA/QUERCUS/BURNING/SATURATED SOILS/EROSION CONTROL/BANK EROSION/CHANNEL EROSION/WINDBREAKS/ EVAPORATION/WILDLIFE HABITATS/HISTORY/PHREATOPHYTES/DEGENERATION/MEIGS SC13

222

THORNTHWAITE, C.W. ET AL.

1942

CLIMATE AND ACCELERATED EROSION IN THE ARID AND SEMI-ARID SOUTHWEST, WITH SPECIAL REFERENCE TO THE POLACCA WASH DRAINAGE BASIN, ARIZONA.

U.S. DEPARTMENT OF AGRICULTURE, TECHNICAL BULLETIN 808. 134 P.

AN ANALYSIS OF THE CLIMATE IN THE SOUTHWEST AND ITS RELATION TO EROSION AND OVERGRAZING IS MADE. THE REPORT IS IN 3 PARTS: CLIMATE, NORMAL AND ACCELERATED EROSION IN A SELECTED DRAINAGE BASIN, AND THE HISTORY OF EROSION. THE PART ON CLIMATE EXAMINES AIR MASSES, VARIATIONS IN TEMPERATURE AND PRECIPITATION, EXCESSIVE PRECIPITATION, DROUGHTS AND CLIMATIC PATTERNS. PART 2 EXAMINES THE BASIC CONDITIONS GOVERNING EROSION: CLIMATE, GEOLOGY,SOIL, VEGETATION, LAND USE AND PRESENT EROSION CONDITIONS IN THE BLACK MESA, TUSAYAN WASHES, AND PAINTED DESERT SECTIONS. RECENT ACCELERATED EROSION IN THIS AREA IS DESCRIBED. IN PART 3 THE CAUSES OF EROSION (DIASTROPHISM, AGRICULTURE, CLIMATE AND GRAZING) ARE EXAMINED. ACCELERATION OF EROSION WAS ACCOMPANIED BY DEPLETION OF VEGETATION. EVIDENCE INDICATES NO CLIMATIC CHANGE IN THE LAST 2,000 YEARS. THIS ACCELERATED EROSION APPEARS TO HAVE BEEN CAUSED BY MAN. MAN CAN CHECK EROSION AND RECLAIM THE LAND BY PROPER METHODS: MODIFICATION OF CORRALLING SYSTEM, REDUCTION IN ANIMAL UNITS, ROTATIONAL PASTURAGE IN FENCED ENCLOSURES, VEGETATIVE PLANTINGS, DIVERSION DAMS, DISTRIBUTION DITCHES, AND SPREADER STRUCTURES. (OALS)

OALS/WGM/NPS-ONS/CLIMATE/SOUTHWEST U.S./EROSION/RANGE MANAGEMENT/ CYCLES-OF-EROSION CONCEPT/EROSION CONTROL/LAND MANAGEMENT/PLANT COVER/ /VEGETATION EFFECTS/WATERSHED MANAGEMENT/ARID CLIMATE/REGIONAL ANALYSIS/CLIMATIC GEOMORPHOLOGY/CLIMATIC-VEGETAL RELATIONSHIPS/ARIZONA /DROUGHTS/HISTORY/GEOLOGY/LAND RECLAMATION/VEGETATION ESTABLISHMENT/ REVEGETATION/DEGENERATION/WEATHER PATTERNS

223

TODD, C.J./JAMES, R.C.

1972

EXPERIMENTS IN DROUGHT ALLEVIATION.

AMERICAN WATER WORKS ASSOCIATION, JOURNAL 64(9):582-584. SWRA W73-07649.

CURRENT ACTIVITIES ARE SUMMARIZED OF PROJECT SKY-WATER, A PROGRAM SPONSORED BY THE BUREAU OF RECLAMATION AND CONCERNED WITH THE INVESTIGATION AND DEVELOPMENT OF THE TECHNOLOGY REQUIRED FOR THE MANAGEMENT OF ATMOSPHERIC WATER, WITH CONSIDERATIONS OF LEGAL, ECONOMIC, ECOLOGICAL, AND SOCIAL IMPLICATIONS. IT DISCUSSES GENERAL MECHANISMS OF PRECIPITATION, CLOUD SEEDING ATTEMPTS IN WINTER MOUNTAIN STORMS AND SUMMER CUMULUS CLOUDS, CURRENT FIELD RESEARCH AT EXPERIMENTAL STATIONS AND PILOT PROJECTS. SOME OF THE STATES INCLUDED IN THE DISCUSSION ARE: NEW MEXICO, ARIZONA, UTAH, COLORADO, CALIFORNIA, WYOMING, MONTANA, NEVADA, AND THE DAKOTAS. RESULTS ARE REPORTED OF DROUGHT ALLEVIATION ATTEMPTS IN THE STATES OF TEXAS, ARIZONA, AND OKLAHOMA, WHERE REACTION TIME WAS 12, 7, AND 19 DAYS AFTER INITIAL REQUEST. ALL SEEDING OPERATIONS WERE BELIEVED TO INCREASE LOCAL PRECIPITATION BUT LACK OF SCIENTIFIC DATA PRECLUDES SOUND EVALUATION.

OALS/WEATHER MODIFICATION/CLOUD SEEDING/DROUGHTS/ARTIFICIAL PRECIPITATION/SOUTHWEST U.S./LEGAL ASPECTS/PRECIPITATION(ATMOSPHERIC) /SUMMER PRECIPITATION/WINTER PRECIPITATION

224

TREDYTE, K.P.

1969

ZUR SOZIALSTRUKTUR LIBYENS (THE SOCIAL STRUCTURE OF LIBYA).

VIERTELJAHRESBERICHTE (HANNOVER) 37:271-88. WAERSA (12)2711.

DATA FROM CENSUSES OF 1954, 1960 AND 1964 SHOW A 3.6 PERCENT ANNUAL GROWTH RATE OF THE LIBYAN POPULATION, A CONTINUING MIGRATION FROM RURAL AREAS TO URBAN CENTERS, A DECLINE IN AGRICULTURAL EMPLOYMENT AND A RELATIVE DECLINE IN THE AGRICULTURAL LABOR FORCE, WHICH FELL BY ROUGHLY ONE-THIRD DURING THE 10 YEAR PERIOD. THE SOCIAL STRUCTURE HAS CHANGED RAPIDLY IN THE AREAS DIRECTLY AFFECTED BY ECONOMIC DEVELOPMENT, BUT THE TRADITIONAL SOCIAL FRAMEWORK OF NOMADISM, TRIBALISM AND SANUSIYAH STILL RETAINS ITS OVERALL SIGNIFICANCE. ONE-FIFTH OF THE POPULATION STILL LEADS A NOMADIC OR SEMI-NOMADIC EXISTENCE. ALTHOUGH LAND DISTRIBUTION IN LIBYA IS FAR FROM EGALITARIAN, THE USUAL SOCIAL PROBLEMS ARISING FROM LARGE LANDED ESTATES AND ABSENTEE LANDLORDISM HAVE NOT ARISEN. PROLONGED NOMADISM AND THE IRREGULAR CLIMATE HAVE HINDERED THE EMERGENCE OF A CHARACTERISTIC FORM OF FEUDALISM. THE FRAGMENTATION OF LAND HOLDINGS IS A CONSEQUENCE OF THE LIBYAN PEASANTS NOMADIC PAST.

OALS/LIBYA/SOCIAL ORGANIZATION/SOCIAL ASPECTS/SETTLEMENTS/NOMADS/LAND RESOURCES/CYRENAICA/TRIPOLITANIA

225

TRICART, J.

1963

OSCILLATIONS ET MODIFICATIONS DE CARACTERE DE LA ZONE ARIDE EN AFRIQUE ET EN AMERIQUE LATINE LORS DES PERIODES GLACIAIRES DES HAUTES LATITUDES(FLUCTUATIONS AND MODIFICATIONS OF THE ARID ZONE IN AFRICA AND LATIN AMERICA DURING PERIODS OF HIGH LATITUDE GLACIATION). UNESCO, PARIS.

ARID ZONE RESEARCH 20:415-419.

GEOMORPHOLOGICAL STUDIES BASED ON DETRITIC SEDIMENT ANALYSIS SHOWS A GENERAL SHIFTING OF CLIMATIC ZONES SOUTHWARD IN WESTERN AFRICA SINCE THE LAST COLD PERIOD. IN SOUTH AMERICA PALEOCLIMATIC OSCILLATIONS, FOUND ALONG MOST RIVERS IN WESTERN AFRICA, ARE MINOR, BECAUSE THE SOURCE OF ARIDITY IS NOT ZONAL BUT TOPOGRAPHIC. IN NORTHERN CHILE AND PERU THERE IS EVIDENCE OF LESS ARID PERIODS. THE HUMBOLDT CURRENT SEEMS TO HAVE VARIED AS A RESULT OF CHANGES IN THE AMOUNT OF MELT WATER ORIGINATING PRINCIPALLY FROM THE CONTINENTAL ICE MASSES OF THE ANTARCTIC.

OALS/CLIMATIC CHANGE/PALEOCLIMATOLOGY/GLACIAL GEOLOGY/ARID CLIMATE/ AFRICA/PERUVIAN DESERT/ATACAMA/CHILE/PERU/PERU CURRENT/CLIMATIC GEOMORPHOLOGY

226

TROUSDALE, W.

1967

LAND OF THE SISTAN SANDS.

MID EAST 7(7):7-14.

LOCATED IN THE SOUTHWESTERN CORNER OF AFGHANISTAN AND SOUTHEASTERN IRAN, THE AREA IS A LAND OF EXTREMES, CONSISTING FOR THE MOST PART OF DESERT SANDS AND A SALT-ENCRUSTED CLAY PLAIN. THERE IS A WIDE RANGE OF TEMPERATURES, FROM A LOW NEAR ZERO F TO A HIGH OF 130 DEGREES F, WITH STRONG WINDS BLOWING FROM MAY TO SEPTEMBER CREATING PERPETUAL DUST STORMS. THE RUINS OF EARLIER OCCUPATION ARE SO EXTENSIVE THAT THE CONCLUSION IS UNAVOIDABLE THAT THE ENVIRONMENT FORMERLY WAS HOSPITABLE ENOUGH TO SUPPORT A MUCH GREATER POPULATION THAN SURVIVES AT PRESENT.

OALS/AFGHANISTAN/IRAN/DESERTIFICATION/SAND DESERTS/PLAINS/TEMPERATURE RANGES/IRANIAN DESERT/HELMAND RIVER/BASINS/DUST STORMS

227

TUAN, YI-FU

1966

NEW MEXICAN GULLIES, A CRITICAL REVIEW AND SOME RECENT OBSERVATIONS.

ASSOCIATION OF AMERICAN GEOGRAPHERS, ANNALS 56(4):573-597. GA 69A-989; ANAG(1967)9121.

GULLIES CUT IN ALLUVIAL FILL ARE COMMON FEATURES OF THE NEW MEXICO LANDSCAPE, AND ARE MOST CONSPICUOUS IN A SEMI-ARID UPLAND ENVIRONMENT. THIS PAPER IS CONCERNED WITH TYPES OF GULLIES AND THEIR REGIONAL SETTING, COMPARISON OF MODERN GULLIES, CHANGES IN FORM AND DEPTH SINCE THE LATE 19TH CENTURY, AND PROBLEMS OF ENVIRONMENTAL INTERPRETATION. ALLUVIAL FILL, EROSIONAL CONDITIONS, POLLEN RECORD, AND CLIMATE ARE BRIEFLY CONSIDERED, AND TWO ENVIRONMENTAL MODELS ARE EVALUATED. THE ONE DESIGNATED THE MARTIN-SCHOENWETTER MODEL IS FAVORED IN THAT GULLYING IS REGARDED AS THE RESULT OF AN INCREASE IN THE NUMBER AND ENERGY OF SUMMER RAINS, AND THAT IT IS SUPPORTED TO SOME EXTENT BY RECENT OBSERVATIONS.

DEGRADATION(STREAM)/OALS/NEW MEXICO/GULLY EROSION/CHANNEL EROSION/ EROSION/DEPOSITION(SEDIMENTS)/MODELS/SEMIARID CLIMATE/ALLUVIUM/ CLIMATIC CHANGE /SUMMER PRECIPITATION

228

UNESCO/WMO

1963

CHANGES OF CLIMATE, PROCEEDINGS OF THE ROME SYMPOSIUM ORGANIZED BY UNESCO AND THE WORLD METEOROLOGICAL ORGANIZATION.

UNESCO, PARIS. ARID ZONE RESEARCH 20. 488 P.

THE PROBLEM OF CLIMATIC FLUCTUATIONS IS ONE OF EXTREME COMPLEXITY RELATING TO MANY DISCIPLINES. AT THE SAME TIME IT IS OF PARTICULARLY GREAT IMPORTANCE IN THE ARID ZONE, WHERE MINOR VARIATIONS MAY HAVE CONSIDERABLE CONSEQUENCES. THIS SYMPOSIUM BROUGHT TOGETHER SCIENTISTS FROM SUCH FIELDS AS METEOROLOGY, OCEANOGRAPHY, GEOMORPHOLOGY, GEOGRAPHY, HYDROLOGY, BOTANY, GEOLOGY, AND ARCHAEOLOGY, TO OBTAIN A COHERENT AND COMPREHENSIVE PICTURE OF PRESENT KNOWLEDGE, THEORIES AND IMPLICATIONS OF CLIMATIC CHANGE. PAPERS ARE GROUPED INTO FOUR SECTIONS: 1) CHANGES DURING THE PERIOD OF METEOROLOGICAL RECORDS, 2) DURING LATE GEOLOGICAL AND EARLY HISTORICAL RECORDS, 3) THEORIES OF CHANGES OF CLIMATE, AND 4) SIGNIFICANCE OF CHANGES OF CLIMATE.

OALS/CLIMATIC CHANGE/METEOROLOGICAL DATA/CLIMATIC DATA/ PALEOCLIMATOLOGY/ATMOSPHERIC CIRCULATION/QUATERNARY PERIOD/CLIMATIC GEOMORPHOLOGY/EVOLUTION/GEOLOGIC TIME

229

UNION OF SOUTH AFRICA, DESERT ENCROACHMENT COMMITTEE

1951

REPORT.

GOVERNMENT PRINTER, PRETORIA. (U.G. 59). 27 P.

A REPORT ON CAUSES OF DESICCATION, ESPECIALLY IN THE KARROO AREA. PUBLIC OPINION AND SCIENTIFIC RECORDS WERE SCRUTINIZED. SIGNIFICANT CHANGES HAVE TAKEN PLACE IN THE VEGETATION. BOTH VEGETATION AND SOIL CHANGES CAN BE SHOWN TO BE DIRECTLY RELATED TO THE WAY IN WHICH MAN HAS USED THE LAND. THE PRIMARY CAUSES OF VELD DETERIORATION ARE RELATED TO THE CHANGE-OVER FROM FREE-ROAMING GAME TO DOMESTIC STOCK-RAISING IN CONFINED AREAS. SINCE GAME HAS BEEN PERMANENTLY REPLACED BY DOMESTIC ANIMALS RESTORATION OF THE VELD TO ITS ORIGINAL CONDITION IS NOT DESIRABLE, BUT RATHER ESTABLISHMENT OF STABLE LEVEL OF PRODUCTIVITY WITHOUT DETERIORATION. CLIMATIC FLUCTUATIONS ARE TO BE EXPECTED; NO LONG-TERM CLIMATIC CHANGES ARE EVIDENT. SEVERAL SCHEMES AIMED AT ALTERING CLIMATIC CONDITIONS WERE FOUND UNTENABLE. EFFORTS AT UNDERSTANDING VELD GRAZING MANAGEMENT ARE NEEDED.

OALS/HYDROLOGY/WEATHER/CLIMATOLOGY/GRAZING/WELLS/GROUNDWATER/ARID CLIMATE/SEMIARID CLIMATE/DROUGHTS/PRECIPITATION(ATMOSPHERIC) /WEATHER MODIFICATION/CLOUD SEEDING/WEATHER FORECASTING /STORMS/SOIL EROSION/ RANGE MANAGEMENT/VEGETATION CHANGE/SOUTH AFRICA/KARROO/SAVANNA/ CLIMATIC CHANGE/DESICCATION/DESERTIFICATION

230

UNITED NATIONS DEVELOPMENT PROGRAMME

1966

GENERAL REPORT ON THE GROUNDWATER INVESTIGATION OF THE AZRAQ BASIN.

UNITED NATIONS, NEW YORK. 64 P. SWRA(2)W69-09200/MGA 21.1-795.

THIS PROJECT ASSESSES GROUND- AND SURFACE-WATER POTENTIAL OF THE AZRAQ AREA, JORDAN. RESULTS OF A COMPREHENSIVE STUDY INDICATE THAT SAFE PERENNIAL YIELD OF GROUNDWATER IN THE AZRAQ BASIN IS NOT ADEQUATE TO MEET REQUIREMENTS OF PROPOSED PLANS FOR IRRIGATION OF LARGE AREAS OF ADDITIONAL LANDS IN THE BASIN OR FOR EXPORTATION. FIELD DATA SHOW THAT IN ADDITION TO GROUNDWATER PERENNIALLY AVAILABLE IN THE BASIN, A LARGE VOLUME OF WATER IS CONTAINED IN STORAGE IN GEOLOGIC FORMATIONS. IT SEEMS UNWISE TO MINE THIS STORED WATER FOR IRRIGATION AGRICULTURE UNDER CURRENT CONDITIONS BECAUSE, AS THE QUANTITY IN STORAGE IS DEPLETED, THE GROUNDWATER TABLE DECLINES AND IRRIGATION COSTS STEADILY INCREASE. THE REPORT PROVIDES INFORMATION ON GEOLOGY, HYDROLOGY AND CHEMISTRY OF THE WATER. RECORDS AND LOGS OF SELECTED WELLS ARE INCLUDED.

WATER YIELD IMPROVEMENT/WATER RESOURCES/GROUNDWATER BASINS/SURVEYS/ WELLS/DESERTS/WATER QUALITY/RECHARGE/DISCHARGE,WATER/HYDROLOGIC DATA/ WATER SOURCES/AQUIFERS/SPRINGS/JORDAN/AZRAQ/HYDROGEOLOGY/IRRIGATION PROGRAMS/WITHDRAWAL/SURFACE WATERS/GROUNDWATER MINING/WATER TABLE/ OALS

231

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, OFFICE OF SCIENCE AND TECHNOLOGY

1972

DESERT ENCROACHMENT ON ARABLE LANDS: SIGNIFICANCE, CAUSES, AND CONTROL.

SAME AS AUTHOR, WASHINGTON, D.C. 55 P. TA/OST/72-10.

MAN S ATTEMPT TO SETTLE IN SEMI-ARID REGIONS OF THE WORLD HAS OFTEN BEEN HINDERED OR THWARTED BY THE SEEMINGLY RELENTLESS PROGRESSION OF ADJACENT DESERTS. EITHER BECAUSE OF CLIMATIC FLUCTUATIONS OR MAN S INTERVENTION IN THE FRAGILE, DELICATELY-BALANCED ECOLOGICAL ZONES BORDERING DESERT AREAS, OR DUE TO A COMPLEX INTERACTION OF THESE TWO FACTORS, MARGINAL BUT POTENTIALLY PRODUCTIVE LAND HAS BEEN ABSORBED INTO THE ENCROACHING DESERT WITH ATTENDANT ECONOMIC AND SOCIAL LOSSES. WHILE THIS SITUATION HAS BEEN EXPERIENCED AS LONG AS MAN HAS INHABITATED THESE REGIONS, THE MAGNITUDE OF THE PROBLEM IS RAPIDLY INTENSIFYING AND ITS IMPACT BECOMING MORE ACUTE AS POPULATION GROWTH, AND A SHIFT FROM NOMADISM TO A MORE SEDENTARY EXISTENCE, CREATE PRESSURE FOR THE DEVELOPMENT OF SEMI-ARID BORDER LANDS.

OALS/DESERTIFICATION/SETTLEMENTS/GRAZING/DESICCATION/CLIMATIC CHANGE/ ECOSYSTEMS/TANGIBLE BENEFITS/INTANGIBLE BENEFITS/LAND USE/ARID CLIMATE /SEMIARID CLIMATE/ECONOMICS/CROP PRODUCTION/AFFORESTATION/ARID LANDS/ NOMADS/WATER MANAGEMENT/SHELTERBELTS/WINDBREAKS

232

U.S. OFFICE OF WATER RESOURCES RESEARCH WASHINGTON, D.C., WATER RESOURCES SCIENTIFIC INFORMATION CENTER

1973

WEATHER MODIFICATION: PRECIPITATION INDUCEMENT. A BIBLIOGRAPHY.

SAME AS AUTHOR, WATER RESOURCES SCIENTIFIC INFORMATION CENTER, WASHINGTON, D.C. 246 P.

A COMPILATION OF ABSTRACTS PRODUCED FROM THE COMPUTERIZED INFORMATION BASE COMPRISING SELECTED WATER RESOURCES ABSTRACTS (SWRA). ACCESS IS BY WAY OF A KWIC-TYPE WRAP-AROUND INDEX, WITH SIGNIFICANT KEYWORDS IN ALPHABETICAL ORDER. REFERENCE IS TO THE COMPLETE ABSTRACT BY DOCUMENT NUMBER. THERE IS AN AUTHOR INDEX ALSO. COVERAGE INCLUDES ARTIFICIAL PRECIPITATION, CLOUD SEEDING, RAINFALL, WATER YIELD IMPROVEMENT, AND LEGAL ASPECTS, AS WELL AS SPECIFIC GEOGRAPHIC AREAS. (OALS)

OALS/WEATHER MODIFICATION/BIBLIOGRAPHIES/ARTIFICIAL PRECIPITATION/ ENVIRONMENTAL ENGINEERING/CLOUD SEEDING/WATER YIELD IMPROVEMENT/LEGAL ASPECTS

233

VAN DER SCHYFF, H.P.

1957

BUSH ENCROACHMENT IN SOUTH AFRICA.

HANDBOOK FOR FARMERS IN SOUTH AFRICA 3:732-741.

BUSH ENCROACHMENT IS A SERIOUS NATIONAL PROBLEM, PARTICULARLY FOR CATTLE FARMERS IN THE BUSHVELD REGIONS. IN SOME PLACES CARRYING CAPACITY HAS BEEN REDUCED BY AS MUCH AS 50 PERCENT, GRASSES ARE OUSTED, AND EROSION BEGINS. THORN AND NON-THORNY SCRUB INVADERS ARE LISTED. BUSHVELD REPRESENTS A STAGE WHERE TWO COMPETING COMMUNITIES, GRASS AND BUSH, ARE IN EQUILIBRIUM. WITH THE ADVENT OF EUROPEANS, AND INCREASED GRAZING INTENSITY, GRASS COVER DETERIORATED OPENING THE WAY FOR BUSH ENCROACHMENT. PREVIOUSLY, WHEN GRASS COVER WAS GOOD, VELD FIRES PROBABLY HELPED DESTROY BUSH SEEDLINGS, BUT BURNING OF VELD WITH POOR GRASS COVER RESULTS IN AN INCREASE IN BUSH, DUE TO STIMULATION OF BUSH SEED GERMINATION. CUTTING OF BUSH FOR FENCES BY NATIVES CAN INCREASE BUSH, WHICH REGENERATES FROM THE ROOT STOCK. CHANGES IN THE RATIO OF VARIOUS SPECIES OF GAME, GRAZERS AND BROWSERS, MAY HAVE ENCOURAGED BUSH ENCROACHMENT. CONTROL METHODS ARE 1) NATURAL RESTING AND FIRE PROTECTION, 2) MECHANICAL REMOVAL, AND 3) CHEMICAL HERBICIDES. THE PRINCIPLE MEANS WHEREBY SCRUB ENCROACHMENT CAN BE PREVENTED IS THE MAINTENANCE OF A GOOD ACTIVELY-GROWING GRASS COVER.

OALS/SOUTH AFRICA/SHRUBS/CARRYING CAPACITY/RANGE MANAGEMENT/BRUSH CONTROL/GRAZING/BROWSE/SUCCESSION/BURNING/COMPETITION/SCRUB/PLANT INVADERS/SAVANNA/GRASSLANDS/PERTURBATION

234

VAN NUFFEL, S.

1968

ENKELE ASPEKTEN VAN DE INTERAKTIE TUSSEN VEGETATIE EN CLIMAAT EN KLIMAAT EN DE INVLOED VAN DE MENS (SOME ASPECTS OF THE INTERACTION BETWEEN CLIMATE AND VEGETATION AND BETWEEN CLIMATE AND HUMAN INFLUENCE).

GEOGRAPHIEE/DE AARDRIJKSKUNDE 20:111-131. GA 698/1080.

THE FOLLOWING INFLUENCES ON CLIMATE ARE PRESENTED: CLEARING AND FIRE, MOWING, FERTILIZING, IRRIGATION, PASTURING, INVOLUNTARY AND VOLUNTARY HUMAN INFLUENCE. THE AUTHOR CONCLUDES THAT MAN CAN INFLUENCE CLIMATE AND VEGETATION IN ORDER TO MAKE THE ARID AND SEMI-ARID REGIONS AVAILABLE FOR AGRICULTURE AND BREEDING.

OALS/CLIMATOLOGY/VEGETATION/GRAZING/BURNING/IRRIGATION/ARID LANDS/ SEMIARID CLIMATE/CLIMATIC-VEGETAL RELATIONSHIPS

235

VAN ZINDEREN BAKKER, E.M.

1966

THE PLUVIAL THEORY; AN EVALUATION IN THE LIGHT OF NEW EVIDENCE, ESPECIALLY FOR AFRICA.

PALAEOBOTANIST (LUCKNOW) 15(1-2):128-134. GA 68A/817.

THE EXPLANATION OF THE PALAEOCLIMATES OF AFRICA SHOULD BE BASED ON THE PRINCIPLE OF CLIMATIC ACTUALITY AS IT WILL BE IMPOSSIBLE TO EXPLAIN THE FORMER CLIMATES WITHOUT KNOWING THOSE OF THE PRESENT DAY. THE VARIATIONS IN TEMPERATURE WHICH HAVE OCCURRED SIMULTANEOUSLY WITH THE GLACIAL HISTORY, SHOULD BE TAKEN INTO ACCOUNT IN THIS RESPECT. GOOD PROOF HAS BEEN FOUND FOR HYPOTHERMAL PLUVIALS IN SOME PARTS OF SAHARAN AND EQUATORIAL AFRICA. CONVINCING EVIDENCE HAS ALSO BEEN PUBLISHED FOR THE EXISTENCE OF SUBPLUVIALS OF NEOLITHIC (ATLANTIC) AGE IN THE SAHARA. DRY INTERPLUVIAL CONDITIONS OF WUERMIAN AGE HAVE BEEN DESCRIBED FOR THE STANLEY-POOL AREA AND FOR ETHIOPIA. IN AFRICA THERE IS A GREAT NEED FOR MANY MORE C14 DATES OF MATERIAL OF ECOLOGICAL INTEREST. (AUTHOR)

RADIOCARBON DATING/OALS/AFRICA/PALEOCLIMATOLOGY/CLIMATOLOGY/SAHARA/ CLIMATIC CHANGE

236

VAN ZINDEREN BAKKER, E.M.

1967

UPPER PLEISTOCENE AND HOLOCENE STRATIGRAPHY AND ECOLOGY ON THE BASIS OF VEGETATION CHANGES SUB-SAHARAN AFRICA. IN W.W.BISHOP AND J.D.CLARK, EDS., BACKGROUND TO EVOLUTION IN AFRICA, P. 125-147.

UNIVERSITY OF CHICAGO PRESS. GA 688-56.

STUDY OF THE PALAEO-ECOLOGY OF THE VEGETATION OF THE UPPER PLEISTOCENE AND HOLOCENE HAS BEEN FOUNDED ON THE PRINCIPLE OF COMPARISON WITH PRESENT DAY ECOLOGY. THE ECOLOGY OF PRESENT DAY PLANTS CANNOT BE UNDERSTOOD WITHOUT ANALYZING THE NUMEROUS INTERDEPENDENT FACTORS OF SOIL AND CLIMATE AFFECTING THE LIFE OF PLANTS. A BRIEF DESCRIPTION IS GIVEN OF SEVEN DIFFERENT TYPES OF VEGETATION AND THEIR CLIMATIC CONTEXT IN THE PART OF AFRICA UNDER CONSIDERATION. ANALYSIS OF LOCAL POLLENS FROM THE SEVEN SITES INDICATES THAT DURING THE UPPER PLEISTOCENE AND HOLOCENE THEY WERE LOCALITIES WHERE CHANGES OF TEMPERATURE TOOK PLACE OF SIMILAR AMPLITUDE TO AND CONTEMPORANEOUS WITH THOSE WELL KNOWN IN THE NORTHERN HEMISPHERE. THESE TEMPERATURE VARIATIONS, WHICH WERE APPARENTLY WORLDWIDE, HAVE BEEN CONSIDERED AS THE PRINCIPAL FACTOR WHICH COULD EXPLAIN THE PALAEOECOLOGICAL DATA. THE HUMIDITY FACTOR IS SECONDARY AND OF MORE LOCAL EFFECT. OBSERVATION UPON PRESENT DAY ENVIRONMENTS INDICATE CHANGES OF SIMILAR MAGNITUDE TO THOSE IMPLIED BY STUDY OF THE FOSSIL POLLEN. THESE IDEAS ARE USED TO RECONSTRUCT A GENERAL PALAEO-CLIMATIC SCHEME FOR AFRICA DURING HYPOTHERMALS AND HYPERTHERMALS. MAPS HAVE BEEN DRAWN UP TO INDICATE THE POSSIBLE CHANGES WHICH HAVE BEEN PRESENTED IN THIS PAPER. CHANGES IN WIND PATTERN AND CORRESPONDING VARIATIONS IN OCEAN CURRENTS ARE SUGGESTED. THE EXISTING INFORMATION STRONGLY SUGGESTS THAT BOTH THE ARID AND MORE HUMID REGIONS HAVE BEEN CONSIDERABLY EXTENDED IN THE PAST GIVING RISE

TO LARGE SCALE MIGRATIONS OF PLANTS AND ANIMALS. SUCH CONCEPTS ARE ESSENTIAL TO AN UNDERSTANDING OF THE LIFE OF PREHISTORIC MAN.

PLEISTOCENE EPOCH/PALEOCLIMATOLOGY/PALYNOLOGY/SAHELIAN ZONE/HOLOCENE EPOCH/CLIMATIC GEOMORPHOLOGY/VEGETATION CHANGE/SAHARA/CLIMATIC CHANGE/ OALS

237

VERSTAPPEN, H.T.

1970

AEOLIAN GEOMORPHOLOGY OF THE THAR DESERT AND PALAEO-CLIMATES.

ZEITSCHRIFT FUER GEOMORPHOLOGIE, SUPPLEMENTBAND 10:104-120. MGA 23.2-485.

A SEQUENCE OF AEOLIAN LANDFORMS IN THE THAR DESERT REVEALS HUGE SAND SHIELDS DEPOSITED WINDWARD OF THE HILLS UNDER CONDITIONS OF PRONOUNCED ARIDITY, PRESUMABLY DURING THE COLD, EARLY HOLOCENE. THESE OBSTACLE DUNES WERE DEEPLY DISSECTED DURING A MORE RAINY PERIOD. ARCHAEOLOGICAL EVIDENCE INDICATES AN AGE OF 5000 BP, BUT THE DECREASE IN ARIDITY MAY HAVE STARTED EARLIER. FROM THE SANDS WASHED OUT OF THE SAND SHIELDS, PARABOLIC DUNES WERE FORMED. AT PRESENT, ONLY BARCHANS ARE FORMED FROM A SLIGHT INCREASE IN DRYNESS. A CORRELATION OF ARIDITY WITH COLD (GLACIAL) PERIODS SEEMS TO BE CHARACTERITIC AND IS EXPLAINED BY AN EXPANSION OF THE ASIATIC BAROMETRIC HIGH AND THE DEVELOPMENT OF THE MONSOONAL WIND SYSTEM UNDER THOSE CONDITIONS. THE AUTHOR DIVIDES THE SUBTROPICAL ARID BELT INTO 1) THE CONTINENTAL PART, 2) THE MEDITERRANEAN PART, 3) THE MONSOONAL PART. ONLY IN THE SECOND PART DOES ARIDITY SEEM TO BE CORRELATED WITH WARM (INTERGLACIAL) CONDITIONS. (AUTHOR)

OALS/GEOMORPHOLOGY/THAR DESERT/PALEOCLIMATOLOGY/SAND DUNES/GLACIOLOGY /CLIMATIC CHANGE/CLIMATIC GEOMORPHOLOGY /WIND ACTION/DESICCATION/ DESERTIFICATION/ARIDITY/DUNES

238

VITA-FINZI, C.

1967

LATE QUATERNARY ALLUVIAL CHRONOLOGY OF NORTHERN ALGERIA.

MAN 2(2):205-215. GA 68A-1744.

IN NORTHERN ALGERIA TWO PHASES OF STREAM AGGRADATION FOLLOWED THE MARINE TRANSGRESSION OF THE LAST INTERGLACIAL. THE FIRST (MAZOUNA STAGE), WHICH WAS LOCALLY PRECEDED BY THE DEPOSITION OF TUFA BY SPRINGS, COINCIDED WITH THE MARINE REGRESSION OF THE LAST GLACIATION. DEPOSITION ENDED NOT LATER THAN 9,000-7,000 B.C. AND, AFTER AN INTERVENTING PERIOD OF STREAM INCISION, THE CHELIF PHASE OF AGGRADATION BUILT UP THE VALLEY FLOORS IN WHICH THE MODERN WADIS WERE ENTRENCHED IN POST-ROMAN TIMES. THE ALGERIAN SUCCESSION OFFERS EVIDENCE FOR A WET EARLY WUERM FOLLOWED BY A COLD MAIN WUERM, WITH THE ADDITION OF A MEDIEVAL INTERLUDE OF MORE EQUABLE STREAM DISCHARGES,

WHICH WAS PRECEDED AND FOLLOWED BY FLUVIAL EROSION ACCELERATED BY HUMAN ACTIVITY.

OALS/ALGERIA/QUATERNARY PERIOD/ALLUVIUM/CLIMATIC GEOMORPHOLOGY/ CLIMATIC CHANGE/AGGRADATION/DEPOSITION(SEDIMENTS)/EROSION

239

WALDEMAR, H.

1970

UBER DEN ABFLUSS IM EINZUGSBEREICH DES TOTEN MEERES WAHREND DER LETZTEN KALTZEIT UND HEUTE (RUNOFF IN THE CATCHMENT OF THE DEAD SEA DURING THE LAST ICE-AGE AND TODAY).

ARCHIV FUER METEOROLOGIE, GEOPHYSIK UND BIOKLIMATOLOGIE, SER. B 18(2):101-130. ENGLISH AND GERMAN SUMMARIES. MGA 22.12-424.

DURING COLD PERIODS OF THE PLEISTOCENE, POTENTIAL EVAPORATION WAS LESS THAN TODAY. THE WATER BALANCE, THEREFORE, WAS CHANGED EVERYWHERE. HOW FAR AT THAT TIME PRECIPITATION AMOUNT AND DISTRIBUTION DIFFERED IN JORDAN FROM TODAY IS NOT TO BE VERIFIED DIFECTLY. FOR THE PRESENT, IT SEEMS OBVIOUS TO TAKE THE PRECIPITATION OF THE LAST COLD PERIOD AS SIMILAR TO NOW AND TO INVESTIGATE THE CONSEQUENCES OF REDUCTIONS OF TEMPERATURE ON THE WATER BALANCE ONLY. THE RISING OF RUNOFF HEIGHT AND AMOUNT IS EVALUATED USING THE RESULTS OF CLIMATOLOGICAL MEASUREMENTS OF TEMPERATURE AND PRECIPITATION AT JERUSALEM FOR 93 YEARS AND AT AMMAN FOR 40 YEARS AND WITH A GENERAL DROP OF TEMPERATURE OF 5 AND 10 DEGREES ALSO. ACCORDING TO THESE RESULTS, ESTIMATIONS OF THE CHANGING AMOUNT OF RUNOFF FOR WEST AND EAST JORDAN ARE PERFORMED BY LOWERING THE TEMPERATURES BY 1 DEGREE TO 10 DEGREES, AND BY RISING THE PRECIPITATIONS TO 10 AND 20 PERCENT. THE RESULTS ARE CHECKED BY MEANS OF THE FLUCTUATIONS THE WATER BALANCE OF THE DEAD SEA CARRIED OUT FROM 23,000 YEARS AGO TO THE PRESENT. THE FIRST HALF OF A DROP IN TEMPERATURE OF THE DIMENSION OF SUCH A COLD PERIOD HAS A MUCH GREATER INFLUENCE THAN THE SECOND ONE ON THE REDUCTION OF EVAPORATION AND ON THE INCREASE OF RUNOFF, AND CONSEQUENTLY, ON THE WATER BALANCE. (AUTHOR)

OALS/PLEISTOCENE EPOCH/HYDROLOGY/WATER BALANCE/JORDAN/ PALEOCLIMATOLOGY/CLIMATIC CHANGE/CLIMATIC DATA/CATCHMENTS/DEAD SEA/ ISRAEL

240

WARREN, A.

1969

A BIBLIOGRAPHY OF DESERT DUNES AND ASSOCIATED PHENOMENA. IN W.G. MCGINNIES AND B.J. GOLDMAN, EDS., ARID LANDS IN PERSPECTIVE, P. 77-99.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, WASHINGTON, D.C.; UNIVERSITY OF ARIZONA PRESS, TUCSON. 421 P.

APPROXIMATELY 800 ITEMS ARE LISTED COVERING WORLD-WIDE LITERATURE ON SAND DUNES FOR OVER 90 YEARS, WITH EMPHASIS ON REFERENCES TO THE SAHARA, THE U.S., AND POLAND. THE MATERIAL IS ARRANGED ALPHABETICALLY

WITHIN 20 YEAR CHRONOLOGICAL DIVISIONS, UNDER THE FOLLOWING CATEGORIES: SAND DUNES EXCLUSIVE OF COASTAL DUNES, SAND MOVEMENT BY WIND, AND AEOLIAN SAND. (AUTHOR)

SANDS/OALS/BIBLIOGRAPHIES/SAHARA/DUNES/WIND ACTION/EOLIAN SOILS

241

WATTERSON, G.G. COMP.

1963

CONSERVATION OF NATURE AND NATURAL RESOURCES IN MODERN AFRICAN STATES. REPORT OF A SYMPOSIUM ORGANIZED BY CCTA AND IUCN AND HELD UNDER THE AUSPICES OF FAO AND UNESCO AT ARUSHA, TANGANYIKA, SEPTEMBER 1961.

INTERNATIONAL UNION FOR THE CONSERVATION OF NATURE AND NATURAL RESOURCES, MORGES, SWITZERLAND. 367 P.

THE PUBLICATION IS DESIGNED AS BOTH A SUMMARY OF THE SYMPOSIUM AND AS A HANDBOOK OF THE ESSENTIAL INFORMATION AVAILABLE TO DATE TO WHICH GOVERNMENTS MAY REFER WHEN EXAMINING THE QUESTION OF INCLUDING THEIR WILDLIFE RESOURCES AS AN INTEGRAL PART OF THE OVERALL EFFORT TOWARD ECONOMIC DEVELOPMENT. WILDLIFE IN AFRICA IS THE MOST NEGLECTED, BUT POTENTIALLY ONE OF ITS MOST VALUABLE RENEWABLE NATURAL RESOURCES. TOPICS INCLUDED ARE: THE PRESENT ROLE OF NATURAL RESOURCES, RESEARCH, CONSERVATION AND DEVELOPMENT INCLUDING STAFF TRAINING, THE PLACE OF NATURE CONSERVATION IN LAND USE PLANNING, WILD FAUNA AND FLORA AS A CULTURAL AND ECONOMIC ASSET, AND LOCAL HUMAN ATTITUDES AND INTERNATIONAL INTEREST. RECOMMENDATIONS ARE MADE FOR WILDLIFE RESOURCE CONSERVATION. (OALS)

OALS/WILDLIFE MANAGEMENT/ENDANGERED SPECIES/NATURAL RESOURCES/ANIMAL DAMAGE/AFRICA/CONSERVATION/HUMAN RESOURCES/POLITICAL ASPECTS/SOCIAL ASPECTS/GRAZING/LAND USE/PARKS/ECOLOGY/DESICCATION/DESERTIFICATION

242

WHITE, G.F.

1960

SCIENCE AND THE FUTURE OF ARID LANDS.

UNESCO, PARIS. 96 P.

AN EXCELLENT REVIEW OF THE PROBLEMS OF DEVELOPMENT IN ARID LANDS AND UNESCO S ROLE. IN REGARD TO DESERTIFICATION, SINCE ABOUT 2000 B.C. THE FLUCTUATIONS OF TEMPERATURE AND PRECIPITATION HAVE BEEN SUBSTANTIAL, BUT SHOW NO MARKED TRENDS. DURING THE LAST 50 YEARS THERE HAS BEEN A SLIGHT TENDENCY TOWARD HIGHER TEMPERATURES AND LOWER PRECIPITATION. THE MORE DRAMATIC EXAMPLES OF RESOURCE DESTRUCTION DURING THE PAST 3000 YEARS MUST BE TRACED TO MAN RATHER THAN CLIMATE. CHAPTERS PRESENT MATERIAL ON INSTABILITY AND PROMISE, WATER VEGETATION AND SOIL, ANIMAL LIFE, SUN, MINERALS AS ECONOMIC STIMULANTS. THE STRATEGY FOR INTERNATIONAL COLLABORATION, EXCHANGE OF IDEAS, EDUCATION AND FUTURE RESEARCH IS DISCUSSED. THE AUTHOR SEES MINERAL RESOURCE EXPLOITATION AS A TIME-LIMITED SOURCE OF NEEDED CAPITAL TO IMPROVE THE

RENEWABLE RESOURCE POTENTIAL OF ARID LANDS. GRAZING MANAGEMENT IS AN URGENT NEED, REQUIRING NOT ONLY KNOWLEDGE OF TECHNIQUES, BUT OF THE SOCIOLOGICAL PROBLEMS INVOLVED IN INTERGRATING WISE LAND USE PRACTICES INTO THE FABRIC OF PASTORAL CULTURES.

OALS/ARID LANDS/VEGETATION/CLIMATOLOGY/SOCIAL ASPECTS/IRRIGATION/LAND MANAGEMENT/EROSION/LAND USE/RANGE MANAGEMENT/NATURAL RESOURCES/ DESERTIFICATION/DESICCATION/NOMADS/CLIMATIC CHANGE/GRAZING/LAND RESOURCES/ECONOMIC IMPACT

243

WHITE, G.F.

1966

DESERTS AS PRODUCING REGIONS TODAY. IN E.S. HILLS, ED., ARID LANDS: A GEOGRAPHICAL APPRAISAL, P. 421-437.

METHUEN, LONDON; UNESCO, PARIS. 479 P.

THE PRESENT NEED OF RESOURCE MANAGEMENT IN THE WORLD S ARID LANDS IS DISCUSSED. FACTORS AND PROBLEMS INVOLVED IN DECISION MAKING AT GOVERNMENTAL LEVEL ARE RELATED TO ESTIMATING THEIR RESOURCES, TECHNOLOGY AND ECONOMIC EFFICIENCY. FREQUENTLY IN THE PAST THERE HAS BEEN A TENDENCY FOR PUBLIC BODIES TO UNDERESTIMATE THE COSTS OF NEW IRRIGATION AND TO OVERESTIMATE THE BENEFITS. WITH INCREASING COMPLEXITY OF MANAGEMENT SCHEMES IT BECOMES MORE IMPORTANT TO LINK PROJECTS OF GEOGRAPHICALLY ADJACENT AREAS, OFTEN CROSSING POLITICAL BOUNDARIES. VARIOUS DIFFERENT SOCIOLOGICAL BENEFITS CAN RESULT, DEPENDING ON GOAL ORIENTATION. EXAMPLES ILLUSTRATE THE CONCEPTS DISCUSSED.

OALS/ARID LANDS/NATURAL RESOURCES/REGIONAL ANALYSIS/LAND RESOURCES/ WATER RESOURCES DEVELOPMENT/DESERTS/LAND MANAGEMENT/ECONOMIC DEVELOPMENT

244

WHITE, G.F.

1970

UNRESOLVED ISSUES. IN H.E. DREGNE, ED., ARID LANDS IN TRANSITION, P. 481-191.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, WASHINGTON, D.C., PUBLICATION 90. SWRA W71-08450.

THIS FINAL PAPER GIVEN AT AN INTERNATIONAL SYMPOSIUM ON ARID LANDS IN A CHANGING WORLD SUMMARIZES THE MAJOR SOCIAL ISSUES CRITICAL IN RESOURCE DEVELOPMENT. HE CITES OVERPOPULATION, MASSIVE MIGRATION FROM RURAL TO URBAN AREAS, AND LACK OF LOCAL EDUCATION, TECHNOLOGY, AND FUNDING. QUESTIONS RAISED RELATE TO THE ROLE OF IRRIGATION, WHETHER NEW DEVELOPMENT SHOULD EXPAND OR INTENSIFY, WHETHER THE SINGLE BIG PROJECT SHOULD TAKE PRECEDENCE OVER DIVERSE SMALLER MEASURES, WHAT THE ROLE OF AMENITIES SHOULD BE, WHETHER BASIC RELATIONSHIPS OR

PROBLEM-SOLVING SHOULD BE STRESSED, HOW WORLD LINKAGES CAN BE ACHIEVED, AND IF INTEGRATED STUDY AND ACTION CAN BE ACCOMPLISHED. (OALS)

OALS/ARID LANDS/SOCIAL ASPECTS/LEGAL ASPECTS/POLITICAL ASPECTS/ NATURAL RESOURCES/ENVIRONMENTAL ENGINEERING/IRRIGATION PRACTICES

245

WHYTE, R.O.

1961

EVOLUTION OF LAND USE IN SOUTH-WESTERN ASIA.

UNESCO, PARIS. ARID ZONE RESEARCH 17:57-118.

TOPICS TREATED: METHODOLOGY, INTERPRETATION OF INFORMATION AND OBJECTIVES IN RESEARCH; CLIMATE, GEOMORPHOLOGY, SOILS, AND HYDROLOGY; HISTORY OF THE VEGETATION: THE BEGINNINGS OF LAND USE; FIRE, FUEL, AND TIMBER; DOMESTICATION OF CROPS; NATURAL FAUNA AND DOMESTICATION OF ANIMALS: HISTORICAL SEQUENCES. THE RECENT HISTORY OF CLIMATIC CHANGE IN THE AREA IS STILL SUBJECT OF CONTROVERSEY. NATURAL VEGETATION HAS BEEN GREATLY MISUSED IN MAN S ANXIETY TO PROVIDE FOR HIS NEEDS IN TERMS OF TIMBER, FUEL, LAND FOR CULTIVATION AND GRAZING RESOURCES FOR HIS LIVESTOCK. VEGETATIVE REGRESSION IS PROBABLY DUE ONLY SLIGHTLY, IF AT ALL, TO ANY MAJOR OR LOCAL CLIMATIC CHANGE, ALTHOUGH MICROCLIMATIC CHANGE HAS LED TO INCREASED DESICCATION. THE AUTHOR DOCUMENTS THE DESTRUCTION OF FOREST RESOURCES AND STATES THAT THERE IS STILL LITTLE SIGN THAT THE LESSONS OF HISTORY HAVE BEEN READ AND UNDERSTOOD. THIS AREA WAS VERY IMPORTANT IN THE DOMESTICATION OF CROPS AND ANIMALS. THE EVOLUTION OF THEIR INCORPORATION INTO CIVILIZATION AND ITS EFFECT ON LAND USE PATTERNS IS TRACED THROUGH PREHISTORIC AND HISTORIC TIMES. THE ABANDONMENT OF ONCE FERTILE LANDS RESULTED NOT ONLY FROM POOR TECHNOLOGICAL UNDERSTANDING, BUT FREQUENTLY FROM CHANGING SOCIAL AND POLITICAL ATMOSPHERES. 233 REFERENCES.

OALS/HISTORY/LAND USE/LAND RESOURCES/LAND RECLAMATION/ARID LANDS/ GEOMORPHOLOGY/GEOLOGY/HYDROLOGY/WILDLIFE/SOILS/SOCIAL ORGANIZATION/ GRAZING/RANGE MANAGEMENT/VEGETATION/FORESTS/LAND MANAGEMENT/ CULTIVATION /SALINITY/PERTURBATION/DEGENERATION/MIDDLE EAST/CLIMATIC CHANGE/EVOLUTION

246

WHYTE, R.O.

1966

THE USE OF ARID AND SEMI-ARID LAND. IN E.S. HILLS, ED., ARID LANDS: A GEOGRAPHICAL APPRAISAL, P. 301-361.

METHUEN, LONDON; UNESCO, PARIS. 479 P.

THIS REVIEW OF THE PAST AND PRESENT USE AND MISUSE OF ARID AND SEMI-ARID LANDS AND THEIR POTENTIALITIES FOR FUTURE DEVELOPMENT IS BASED PRIMARILY ON THOSE LANDS THAT LIE BETWEEN THE ATLANTIC OCEAN IN THE WEST AND THE GANGETIC PLAIN IN INDIA IN THE EAST. LAND DETERIORATION

HAS RESULTED FROM IGNORANCE, STEADILY INCREASING HUMAN AND LIVESTOCK POPULATIONS, AND A LONG SEQUENCE OF WARS AND INVASIONS. TOPICS TREATED ARE ECONOMIC AND SOCIAL ASPECTS, CLIMATE AS A CONTROLLING AND LIMITING FACTOR, LAND USE ALONG HUMIDITY GRADIENTS, CONSERVATION AND MANAGEMENT OF VEGETATION, ANIMAL HUSBANDRY, CROP HUSBANDRY, CULTIVARS OF THE SEMI-ARID ZONES, TREES IN THE DESERT, CLASSIFICATION OF LAND, AND INTEGRATED LAND-USE. IN NEW LANDS (NORTHERN AUSTRALIA, ICARAGUA, AND PARTS OF BRAZIL) IT IS NECESSARY TO FIND AN ECOLOGICAL EQUILIBRIUM WHICH WILL PERMIT MAN AND HIS ANIMALS TO USE THE LAND AND ITS PARTIALLY UNUSED RESOURCES WITHOUT REDUCING TOO FAR ITS CAPACITY FOR CONSERVATION. IN OTHER AREAS IT IS NECESSARY TO RECOVER SOME NEW EQUILIBRIUM TO REPLACE THE ONE THAT WAS PASSED CENTURIES AGO DURING THE EVOLUTION OF ECOLOGICALLY IGNORANT CIVILIZATIONS. THE BASIC PROBLEM OF THE ARID AND SEMI-ARID ZONES OF THE OLD WORLD IS THE RECOGNITION OF ECOLOGICAL OVER-DEVELOPMENT AND THE INITIATION OF ACTIONS TO BRING MAN AND HIS ANIMALS AGAIN INTO HARMONY WITH THEIR ENVIRONMENT.

OALS/AFRICA/ARID LANDS/ARID CLIMATE/SEMIARID CLIMATE/LAND USE/LAND MANAGEMENT/HISTORY/CONSERVATION/VEGETATION/GRAZING/SOCIAL ASPECTS/ ECOLOGY/PASTURES/RANGE MANAGEMENT/LIMITING FACTORS/ECONOMICS/ ENVIRONMENTAL EFFECTS/CROP PRODUCTION/EVOLUTION/ECONOMIC DEVELOPMENT/ NOMADS/DESERTIFICATION

247

WINTERBOTTOM, J.M.

1971

WATER AND WILD LIFE.

SOUTH AFRICAN JOURNAL OF SCIENCE 67(3):101-102. SWRA W71-12129.

THE WESTERN PART OF SOUTH AFRICA IS ARID-SEMIARID WITH A MARKEDLY SEASONAL RAINFALL. UNDER NATURAL CONDITIONS, THE LARGER ANIMALS ARE CONCENTRATED AT THE PERMANENT WATER SITES DURING THE DRY SEASON AND THEN DISPERSE OVER WIDE AREAS DURING THE RAINY SEASON. IN AREAS WHERE THE RAINFALL IS EXTREMELY IRREGULAR, THE ANIMALS ARE NOMADIC, FOLLOWING THE WIDELY SEPARATED RAINS AND TAKING ADVANTAGE OF THE RESULTING TEMPORARY VEGETATION. MAN S ACTIVITIES IN THE ENVIRONMENT HAVE SEVERELY AFFECTED BOTH WAYS OF LIFE AND SET INTO MOTION SOME HIGHLY DESTRUCTIVE CYCLES. FARM FENCING HAS DISRUPTED NORMAL GAME MOVEMENTS, HEAVY SILT LOADS IN STREAMS FROM BAD FARMING HAVE DESTROYED IMPORTANT WATERING AREAS, SWAMP DRAINAGE HAS DESTROYED HABITATS, AND OVER-GRAZING RESULTING FROM THESE AND MANY OTHER FACTORS HAVE FURTHER DESTROYED HABITATS AND SET INTO MOTION MASSIVE SOIL EROSION CYCLES. (OALS)

OALS/KALAHARI-NAMIB/SOUTH AFRICA/WILDLIFE/UNGULATA/WILDLIFE HABITATS/ PERTURBATION/SOIL EROSION/WILDLIFE MANAGEMENT/GRAZING/WATER HOLES

248

WISSMANN, H., VON ET AL

1956

ON THE ROLE OF NATURE AND MAN IN CHANGING THE FACE OF THE ORY BELT OF ASIA. IN W.L. THOMAS, JR., ED., MAN S ROLE IN CHANGING THE FACE OF THE EARTH, P. 278-303.

UNIVERSITY OF CHICAGO PRESS, CHICAGO.

SUMMARIZES THE GEOGRAPHICAL AND ANTHROPOLOGICAL HISTORY OF THE RISE, SPREAD AND DEVELOPMENT OF CULTURES, WITH EMPHASIS ON THE EFFECT OF CLIMATE AND ON THE DEVELOPMENT OF HERDING, AGRICULTURE AND NOMADISM. EARLY MIGRATION WAS FACILITATED BY THE STEPPE VEGETATION THAT COVERED MOST OF THE DRY BELT(DURING THE LAST ICE AGE) ALLOWING MORE MIGRATION THAN PRESENT-DAY VEGETATION. VEGETATION STUDIES OF THE DRY BELT (EXTENDING TO INNER ASIA, CENTRAL EUROPE AND CHINA) INDICATE THAT BECAUSE OF LOWER TEMPERATURES, THE BOUNDARIES OF THE THERMAL ZONES WERE EXTENDED OVER MUCH GREATER DISTANCES THAN BOUNDARIES OF HUMID ZONES-INCLUDING ARABLE STEPPE AND DESERT STEPPE. CIVILIZATION SPREAD THROUGHOUT ASIA WITH SETTLEMENTS DEVELOPING CEREAL FARMING, HERDING OF SHEEP AND GOATS, AS WELL AS ELEMENTARY TYPES OF IRRIGATION AND OASIS ECONOMY. FARMING AND HERDING SPREAD INTO 3 DISTINCT REGIONS: 1) THE MIDDLE BELT OF MOROCCO AND SPAIN TO NORTHERN CHINA, WHERE NATURAL OASES AND IRRIGATION ARE STILL OF GREATEST IMPORTANCE; 2) THE SOUTHERN BELT OF THE TROPICAL STEPPE OF THE SUDAN; 3) THE NORTHERN BELT FROM MANCHURIA AND NORTHERN MONGOLIA TO KAZAKHSTAN, SOUTHERN RUSSIA, AND RUMANIA.

OALS/ARID LANDS/ARID CLIMATE/SEMIARID CLIMATE/SOCIAL ASPECTS/HISTORY/ GRAZING/CLIMATOLOGY/AGRICULTURE/CLIMATIC-VEGETAL RELATIONSHIPS/ VEGETATION CHANGE/MIGRATION/NOMADS/CENTRAL ASIA/MIDDLE ASIA/ARABIAN PENINSULA/AFRICA/CHINA/USSR

249

WOODBURY, R.B.

1963

INDIAN ADAPTATION OF ARID ENVIRONMENTS. IN C. HODGE AND P.C. DUISBERG, EDS.. ARIDITY AND MAN.

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, PUBLICATION 74:55-85.

BRIEFLY TRACES MAN S CHANGING ROLES IN THE WESTERN U.S. DISCUSSES FOOD GATHERS, BIG-GAME HUNTERS, VILLAGE-FARMING LIFE, VILLAGES AND WATER SOURCES, WATER-CONTROL TECHNIQUES, DECLINE OF VILLAGE-FARMING LIFE, INTRODUCTION OF ADAPTABLE ATHABASCANS, SHIFT TO WAGEWORK, COLLAPSE OF GREAT BASIN CULTURE, RISE AND FALL OF THE SIOUX, ADJUSTMENT TO RESERVATION LIFE, PAPAGO STRUGGLES IN THE DESERT, INDIAN AJUSTMENTS AND PROSPECTS. CLIMATIC CHANGE IN THE 13TH CENTURY WAS PROBABLY RESPONSIBLE FOR EARLY DECLINE OF VILLAGE FARMING LIFE. GRAZING ABUSES BY INDIANS AND WHITES HAVE RESULTED IN DETERIORATED RANGELANDS. THE PLIGHT OF THE INDIAN IN THE LAST CENTURY OR SO IS NOT THE RESULT OF ENVIRONMENTAL CAUSES SUCH AS ARIDITY; THE CAUSES ARE SOCIAL. IT CAN BE SEEN AS PART OF THE WORLDWIDE PROBLEM OF THE NONLITERATE, NONINDUSTRIAL WORLD CONFRONTED BY THE TECHNOLOGY, SOCIAL AND ETHICAL SYSTEMS OF THE WESTERN WORLD. INDIAN TECHNIQUES AND THEIR

PHILOSOPHY OF WORKING WITH THE ENVIRONMENT RATHER THAN AGAINST IT MAY BE INDISPENSIBLE INGREDIENTS FOR THE SUCCESSFUL UTILIZATION OF ARID LANDS.

INDIANS OF NORTH AMERICA/OALS/SOCIAL ASPECTS/MIGRATION/SOCIAL ORGANIZATION/HISTORY/ARID LANDS/SEMIARID CLIMATE/DRY FARMING/RANGE MANAGEMENT/SOUTHWEST U.S./WATER SPREADING/DROUGHTS/ADAPTATION/GREAT BASIN/GREAT PLAINS/DEGENERATION

250

WORLD METEOROLOGICAL ORGANIZATION

1954

ARTIFICIAL INDUCEMENT OF PRECIPITATION WITH SPECIAL REFERENCE TO THE ARID AND SEMI-ARID REGIONS OF THE WORLD.

SAME AS AUTHOR, TECHNICAL NOTE 1. 24 P. MGA 11M-573.

THIS REVIEW OF WORLDWIDE WEATHER MODIFICATION EFFORTS IS BASED ON REPLIES RECEIVED TO AN INQUIRY BY THE WMO SECRETARIAT. INCLUDED ARE A BRIEF CRITICAL STUDY OF RESULTS ACHIEVED BY VARIOUS PROJECTS, A GENERAL ANALYSIS OF ATMOSPHERIC CONDITIONS FAVORING RAINMAKING EXPERIMENTS IN VARIOUS COUNTRIES, AND SURVEY AND TENTATIVE EVALUATION OF CURRENT TECHNIQUES, AND A LIST OF REFERENCES (87) ARRANGED BY CONTINENTS. IT FOUND THAT OPERATIONS HITHERTO CARRIED OUT PROVED INCONCLUSIVE, REGIONS AND SEASONS FAVORING NATURAL PRECIPITATION ARE ALSO MOST FAVORABLE FOR ARTIFICIAL INDUCEMENT OF PRECIPITATION, AND PRESENT-DAY TECHNIQUES HAVE VERY LITTLE VALUE, IF ANY, IN AUGMENTING PRECIPITATION IN AREAS OF EVERY LOW RAINFALL OR DURING DRY PERIODS IN REGIONS OF NORMALLY MEDIUM RAINFALL. SCIENTIFICALLY RIGOROUS EXPERIMENTATION, DEVELOPMENT OF PRECISE METHODS OF EVALUATION, COLLABORATION WITH METEOROLOGICAL AUTHORITIES AND EXCHANGE OF INFORMATION ARE RECOMMENDED.

OALS/WEATHER MODIFICATION/ARTIFICIAL PRECIPITATION/WEATHER DATA/ METEOROLOGICAL DATA/BIBLIOGRAPHIES/DRY SEASONS /PRECIPITATION DEFICIT/ ARID LANDS/SEMIARID CLIMATE/ARID CLIMATE

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ZGHAL, A.

1967

MODERNIZATION DE L AGRICULTURE ET POPULATIONS SEMI-NOMADES (AGRICULTURAL MODERNIZATION AND SEMI-NOMADIC POPULATIONS).

MOUTON, THE HAGUE. 186 P. WAERSA (10)2929.

THIS STUDY ANALYSES THE SOCIAL SITUATION THAT HAS RESULTED FROM THE APPLICATION OF MODERN IDEAS IN TRADITIONAL TUNISIAN RURAL SOCIETY, WITH THE OBJECT OF SUGGESTING TO PLANNERS A STRATEGY OF MODERN FARM MANAGEMENT WHICH WILL TAKE INTO CONSIDERATION BOTH THE RATIONAL IMPROVEMENT OF AGRICULTURE AND THE SELF-RESPECT OF THE PEASANTS INVOLVED. FOUR IMPROVEMENT AREAS WITHIN THE KAIROUAN GOVERNORATE, THE MOST PROGRESSIVE REGION IN CENTRAL AND SOUTHERN TUNISIA, WERE

EXAMINED, EACH OF WHICH WAS ORGANIZED AND ADMINISTERED IN ACCORDANCE WITH ITS OWN LAND REGULATIONS. THE ADVANTAGES AND SHORTCOMINGS OF EACH PLAN ARE DISCUSSED AND A NEW SYSTEM OF ADMINISTRATION PROPOSED.

OALS/TUNISIA/NOMADS/IRRIGATION/SOCIAL ASPECTS/AGRICULTURE/LAND RESOURCES

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ZHAKOV, S.I.

1966

PRICHINY SUKHOSTI SREDNEI AZII (CAUSES OF THE ARIDITY OF CENTRAL ASIA).

MOSKOVSKOGO UNIVERSITETA, VESTNIK, SER. 5, GEOGRAFIJA 21(4):98-101. MGA 18.2-364.

AN ATTEMPT IS MADE TO REFUTE THE GENERALLY ACCEPTED EXPLANATION OF ARIDITY IN CENTRAL ASIA AS CAUSED BY ITS DISTANCE FROM OCEANS AND THE BARRIER EFFECT OF THE MOUNTAINS, RESULTING IN INADEQUATE MOISTURE TRANSPORT INTO THIS TERRITORY. IT IS STATED THAT THE PRINCIPAL FEATURES OF ITS CLIMATE ARE CAUSED BY THE CHARACTER OF THE CIRCULATION REGIME WHICH DEPENDS ON THE PROCESSES OF A PLANETARY SCALE, UNDER WHOSE CONDITIONS DESERTS EXIST NEAR OCEANS AND WITHIN THE CONTINENT. THESE CLIMATIC FEATURES ARE AGGRAVATED BY INTENSE HEAT AND RELATIVE HUMIDITY RELATED TO LOW EVAPORATION, LEADING TO A HIGH LEVEL OF CONDENSATION WHICH DECREASES STILL MORE THE POSSIBILITY OF PRECIPITATION FORMATION.

OALS/DESICCATION/OROGRAPHY/BARRIERS/MIDDLE ASIA/ATMOSPHERIC CIRCULATION/HUMIDITY/HEAT/CONDENSATION /CLIMATE/ARID CLIMATE

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* Item numbers refer to the Bibliography's numbered references, not to page numbers

KEYWORD INDEX

KEYWORD INDEX*

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