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# DESERTIFICATION :

## A World Bibliography

## P A K I S T A N, I N D I A, A N D C H I N A

Compiled and Edited by

Patricia Paylore
Assistant Director
Office of Arid Lands Studies
University of Arizona

23rd International Geographical Congress, Moscow, 1976
Pre-Conference Meeting of the IGU Working Group on Desertification
Desert Research Institute, Ashkhabad, Turkmen SSR

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University of Arizona
OFFICE OF ARID LANDS STUDIES
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## ACKNOWLEDGMENTS

As Editor, my greatest obligation in the preparation of this bibliography for publication is to Mrs. Jean Mills, Research Assistant, Office of Arid Lands Studies, who virtually lived for five months in the University of Arizona Libraries verifying information submitted by the several regional contributors, and then barricaded herself in her office while she reconciled a variety of styles to the format of our computer program that stores and retrieves from the data base comprising the Arid Lands Information System (ALIS).

The technical staff — Lynn Lybeck, Systems Analyst, Julie V. Garrettson in charge of terminal operations, and Eleanor Smith who assisted her with data entry — produced the document you hold in your hands, all of them sharing the often tedious work of modifying the computer program where necessary, entering the information on the terminal, reading proof three times, and doing the preliminary preparation of printouts for the photoreduction and photoreproduction that enabled us to compress these hundreds of citations into manageable size. My deepest thanks to all, not least for the interest they took in the project and in the subject as well. I hope each thinks of himself as a minor authority on desertification.

The backup support of the University of Arizona, and particularly that of the Office of Arid Lands Studies, is greatly appreciated. Our Director, Dr. Jack D. Johnson, stabilized the disruptions to the Office, inevitable in a project of this magnitude, by his enthusiastic cooperation. Mary Michael, Information Specialist, and Helen Kassander, Research Assistant, helped us meet our deadline by relinquishing their share of the technical staff's time over a period of months.

I am grateful to my colleague, Dr. Andrew W. Wilson, University of Arizona Department of Geography, Regional Development, and Urban Planning, and Vice-Chairman of the IGU Working Group on Desertification, for his counsel and advice during the year we worked on the bibliography, and to Professor Jack W. Mabbutt, Chairman, Department of Geography, University of New South Wales, Kensington, and Chairman of the IGU Working Group, for his willingness to allow me to go forward on the project in my own way. His keen eye and impeccable judgment sharpened my own approach to the undertaking.

To the collaborators throughout the arid world, as noted elsewhere herein, those recognized authorities on the regions represented by their citation contributions, who responded bravely to all my anguished cables to hurry, hurry, my very best thanks. The bibliography is really theirs, expressing as it does their understanding of particular environments and the impact of desertification thereon.

-Patricia Paylore

Tucson

July 4, 1976

## EDITOR'S PREFACE

This bibliography is a selection of largely recent information on worldwide desertification, a greatly expanded listing from that which accompanied a paper on the subject first published by the University of Arizona's Office of Arid Lands Studies in 1973*. It has been compiled and edited for the 23rd International Geographical Congress, Moscow, 1976, more particularly for the Pre-Conference Meeting of the IGU Working Group on Desertification in Ashkhabad, July 1976, since it was under its aegis that the task was undertaken in the summer of 1975.

The Working Group came into being at the IGU's Montreal Congress, 1972, as a successor to the former Commission on the Geography of Arid Lands. Its stated aim was "to collect evidence on the nature and causes of environmental changes constituting an extension of deserts into marginal areas or an intensification of desert conditions within arid regions." Two subsequent field meetings of the Working Group were held: in Alice Springs in the early winter of 1974; and in Cambridge, England, in the early fall of 1975. When the Editor was co-opted to the Working Group, it was agreed that she would depend to a large degree on contributions from various regional collaborators for coverage of specific areas. Those persons are listed here, many of whom are also authors of the brief introductory remarks which precede most sections of the bibliography itself:

| | |
|---|---|
| Worldwide: | Ronald F. Peel, University of Bristol |
| Saharan Region and Sahel: | A. T. Grove, Cambridge University (English) |
| | Monique Mainguet, Reims University (French) |
| | Horst Mensching, University of Hamburg ) |
| | F. N. Ibrahim, University of Hamburg ) (German) |
| | Wolfgang Meckelein, University of Stuttgart ) |
| East Africa: | Leonard Berry, Clark University, Worcester |
| Southern Africa: | Peter D. Tyson, University of Witwatersrand |
| Middle East: | Peter Beaumont, University of Durham |
| USSR: | Michael Petrov, Leningrad University |
| Pakistan: | Mushtaqur Rahman, Iowa State University |
| India: | H. S. Mann, Central Arid Zone Research Institute, Jodhpur |
| Australia: | J. A. Mabbutt, University of New South Wales |
| South America: | Hans J. Schneider, University of New South Wales |
| North America: | Andrew W. Wilson, University of Arizona |

Many of the Regional Organizers have been assisted by local correspondents, who are in effect Corresponding Members of the Working Group.

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* Sherbrooke, W. C. / Paylore, P. (1973) World Desertification: Cause and Effect. A Literature Review and Annotated Bibliography. University of Arizona, Office of Arid Lands Studies, Arid Lands Resource Information Paper 3. 168 p.

The following framework was suggested to the regional contributors early in the project, as a guide to selection of references. While not all items are represented in each gathering, the presence of citations dealing with any of these concepts can be determined from the index for each region.

A. Natural Trends:

1. Climatic changes in the historical period
2. Hydrologic changes
3. Changes in landforms due to the action of water
4. Changes in landforms due to the action of wind
5. Changes in soils
6. Changes in natural vegetation

B. Man's Influence on the Processes of Desertification:

1. Agriculture, dryland or irrigated
2. Pastoralism, rural settlement, and nomadism
3. Forestry, with emphasis on collection of fuel
4. Urbanization
5. Population changes
6. Mining (including oil and gas) and pipeline construction
7. Transportation, including construction of roads, railways, airfields
8. Tourism and recreation

C. Preservational Measures:

1. Studies of status and trend of the environment
2. Regional assessments of natural resources
3. Studies of natural hazards
4. Establishment of natural parks and reserves
5. Other controls of land use

D. Preventive and Remedial Measures:

1. Climate: climatic stress, rainmaking, evaporation suppression, shelterbelts
2. Water supplies: inventories of water resources, water balance or hydrologic cycle, improvement of supplies for drinking, stock or irrigation; water harvesting schemes
3. Erosion control: stabilization of dunes and drift sands, monitoring of processes, measures against water and wind erosion
4. Improvement of desert vegetative cover: surveys of the extent of degradation, range and grazing studies, revegetation of bare areas, pasture improvement, afforestation
5. Control of land use: pastoral, dryland / irrigated agriculture
6. Control of population and settlement: nomads, rural settlement, urban planning, communications
7. Development of alternative resources: regional development, mining, industry tourism, recreation, health care

It was also suggested that we attempt to keep within a timeframe of the past decade. This was done to a large extent, but earlier papers of a classic nature are still included where it is generally agreed that their presentation has not been improved upon.

Because of the massive infusion of bibliographic information, which (even with what, at times, must have appeared to be brutal editorial cuts) still far exceeds the total number of references envisaged when we began, we have had to be arbitrary in the manner in which we have handled some of the information. Where we have departed radically from the format employed to display the greatest percentage of information, such as the USSR, we have appended an explanation following the regional contributor's Introduction. We have included several hundred documents from our own Arid Lands Information System (ALIS) to enhance the coverage submitted by our regional colleagues.

Much work was done at Arizona to bring these hundreds of references into the format required by our computer program. Many references were dropped because of lack of adequate information to identify and locate copies should users so require. For those without the services of skilled documentalists and/or bibliographers to call upon, it has always seemed to us that our meticulous and sometimes fussy insistence on full bibliographical information is the sine qua non of good bibliography. In this respect, while much of the documentation in this bibliography was very difficult indeed, we believe that the smallest percentage humanly possible is included that has not been verified by our staff. We trust, therefore, that because of this care, users will find the full documentation more readily accessible than they would otherwise.

Indexing (except for the USSR) was done from the Thesaurus of Arid Lands Terminology (c1974), developed and used by the Office of Arid Lands Studies for its computerized data bank; and to make the use of the bibliography less cumbersome, subject keywords and authors appear as computerized lists following each section. The documentation from the USSR was sorted out into ten overall categories, and no indexing of individual citations was undertaken.

An effort was made to eliminate all references that did not contribute to an understanding of the phenomenon of desertification itself, rather than to permit the bibliography to become a general arid lands compilation. That we did not always succeed must be attributed not only to our inability to distinguish at times, but also to the disagreements and confusion existing among desert experts as to exactly what constitutes desertification. For those users who miss their favorite citations - their own or others - we ask you to take this constraint into account.

The Editor takes full responsibility for the choice of references carried, and for all shortcomings of coverage or format. I hope the latter will be outweighed by the work's overall usefulness at this critical time in the world's understanding of a biological and physical process that is affecting the lives of millions.

# PAKISTAN

Dr. Mushtaqur Rah. an
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Iowa State University of Science and Technology
Ames, Iowa 50010, USA

## PAKISTAN

Independent Pakistan inherited little in the way of descriptive desert studies, but took title to a barrage-controlled perennial irrigation system introduced by the British in the late 1800's. This system, designed to enhance the productivity of marginal lands, dry interfluves, and the Indus Valley areas was a venture admirable in conception, but by the mid-twentieth century it had already started showing signs of becoming a burden with unwanted consequences.

The following period of national instability and uncertainty surrounding the new country's very survival absorbed the attention of its policy makers and scientists, so that it was only later that Government-sponsored studies through agencies set up especially to deal with environmental problems began to address problems of climate, hydrology, irrigation, agriculture, and reclamation. These interests explain the emphasis on such topics in the bibliography that follows, rather than on the evolution of the deserts, their geology, or animal-plant ecology, which, under other circumstances, would have engaged the country's physical and social scientists. Pakistan has been dry since antiquity, and its people have traditionally taken its deserts for granted. Their preoccupation with those matters that could ameliorate living conditions is reflected in the nation's scientific literature.

# PAKISTAN

1

AFRIDI, F.G.

1960

RECLAMATION OF DEGRADED SOILS AND CONTROL OF THE DESERT IN THE KOHAT FOREST DIVISION, WEST PAKISTAN. IN SYMPOSIUM ON SOIL EROSION AND ITS CONTROL IN THE ARID AND SEMI-ARID ZONES, KARACHI, 1965, PROCEEDINGS, P. 233-236.

FOOD AND AGRICULTURAL COUNCIL, KARACHI, MINISTRY OF FOOD AND AGRICULTURE. 400 P.

SOIL CONSERVATION/LAND RECLAMATION/EROSION CONTROL/SOIL EROSION

2

AHMAD, K.S./KHAN, M.L.

1961

VARIABILITY OF RAINFALL AND ITS BEARING ON AGRICULTURE IN THE ARID AND SEMI-ARID ZONES OF WEST PAKISTAN.

PAKISTAN GEOGRAPHICAL REVIEW 16(1):35-50.

RAINFALL RELIABILITY/AGRICULTURAL CLIMATOLOGY/CLIMATIC-VEGETAL RELATIONSHIPS/ AGRICULTURE/VARIABILITY(ENVIRONMENTAL)

3

BHARADWAJ, O.P.

1961

THE ARID ZONE OF INDIA AND PAKISTAN. IN L.D. STAMP, ED., A HISTORY OF LAND USE IN ARID REGIONS.

UNESCO, PARIS. ARID ZONE RESEARCH 17:143-174.

INDIA/PHYSICAL GEOGRAPHY/LAND USE/AGRICULTURE/HISTORY/CLIMATE/CLIMATIC CHANGE/ PALEOCLIMATOLOGY

BRYSON, R.A./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. A, 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.

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

5

CARBONNEL, J.P./BORDET, P./BOUTIERE, A.

1969

LES ETUDES FRANCAISES SUR LE QUATERNAIRE EN ASIE (FRENCH STUDIES ON THE QUATERNARY IN ASIA). IN ETUDES FRANCAISES SUR LE QUATERNAIRE. PAPT 2. P. 235-245.

INQUA, PARIS. GA 73A-0259.

CARBONNEL CONSIDERS THE QUATERNARY OF INDO-CHINA, CONCENTRATING UPON THE STRATIGRAPHY OF QUATERNARY DEPOSITS, SHORELINE FEATURES AND TERRACES, AND PREHISTORY. BORDET SUMMARIZES FRENCH THINKING ON THE QUATERNARY OF THE HIMALAYA, STRESSING RECENT COASTAL DEFORMATION, SUPERFICIAL ALTERATION AND EROSION, EROSION SURFACES, AND GLACIAL PHENOMENA. BOUTIERE DESCRIBES SOME RECENT WORK ON HOLOCENE FORMATIONS IN CENTRAL AFGHANISTAN, IN PARTICULAR VOLCANIC DEPOSITS AND TRAVERTINES.

AFGHANISTAN/QUATERNARY PERIOD/STRATIGRAPHY/TOPOGRAPHIC FEATURES/PREHISTORY/BIBLIOGRAPHIES/MOUNTAINS/COASTS/GEOMORPHOLOGY/GEOLOGY/EROSION/VOLCANOES/HOLOCENE EPOCH

6

CHAUDHRI, I.I.

1960

SUCCESSION OF VEGETATION IN THE ARID REGIONS OF WEST PAKISTAN PLAINS.

SYMPOSIUM ON SOIL EROSION AND ITS CONTROL IN THE ARID AND SEMI-ARID ZONES, KARACHI, 1957, PROCEEDINGS, P. 141-156.

PLAINS/VEGETATION/SUCCESSION

7

CHAUDHRI, I.I./QADIR, S.A.

1958

SAND DUNES VEGETATION OF COASTAL REGION OF KARACHI.

PAKISTAN JOURNAL OF FORESTRY 8(4):337-341.

SAND DUNES/COASTAL DESERTS/VEGETATION/DESERT PLANTS

8

DRESCH, J.

1965

LE 'DESERT' DE THAR.

ASSOCIATION DE GEOGRAPHES FRANCAIS, BULLETIN 332-333:36-47.

LE 'DESERT DE THAR' N'EST QU'UN SAHEL OU LA VEGETATION SE DEGRADE DE LA FORET SECHE A LA STEPPE. LES FORMES DU RELIEF, PLAINES SABLEUSES ET RELIEFS RESIDUELS, TEMOIGNENT DE MEME DE TRANSITIONS DE L'HUMIDE AU SEC, MAIS AUSSI DE CONDITIONS ARIDES PLUS ETENDUES AU QUATERNAIRE.

INDIA/THAR DESERT/TOPOGRAPHIC FEATURES/CLIMATIC CHANGE/PALEOCLIMATOLOGY

9

EDWARD, J.A.

1965

IRRIGATED FORESTS IN WEST PAKISTAN.

GEOGRAPHY 50(4):378-380.

OF 8.8 MILLION ACRES OF FORESTS IN PAKISTAN (4.3 PERCENT OF THE AREA), THE FOREST DEPARTMENT OWNS 5 MILLION ACRES OF WHICH 1/10 IS IRRIGATED USING A WATER SURPLUS FROM AGRICULTURAL REQUIREMENTS. REDUCTION IN THE AMOUNTS AVAILABLE IN PERIODS OF LOW RIVER FLOW RENDERS THE FORESTS VULNERABLE TO DROUGHT BUT THEY REMAIN A VALUABLE SOURCE OF TIMBER AND FUEL AND REDUCE EVAPORATION FROM IRRIGATION CANALS IN WINDSWEPT AREAS WHEN PLANTED AS SHELTER BELTS. THEY ARE LIKELY TO PLAY A MORE IMPORTANT ROLE IN THE FUTURE ESPECIALLY IN THE SUBSTITUTION OF FIREWOOD FOR DUNG, WHICH CAN THEN BE USED FOR FERTILIZER INSTEAD OF BEING BURNED.

FORESTS/SHELTERBELTS/ENVIRONMENTAL IMPACT/EVAPORATION CONTROL/TIMBER/FUELS

10

ENGINEERING CONSULTING FIRMS ASSOCIATION [OF] JAPAN, TOKYO, PAKISTAN ARID LANDS STUDY MISSION

1970

REPORT ON PRELIMINARY STUDY OF USE OF ASPHALT IN ARID LAND RECLAMATION AND DEVELOPMENT PROJECTS IN WEST PAKISTAN.

SAME AS AUTHOR. 99 P.

A 3 WEEKS SURVEY IN FEBRUARY 1970 WAS MADE ON THE FEASIBILITY OF USING ASPHALT FOR EFFECTIVE UTILIZATION OF INDUS WATER RESOURCES AND FOR CONTROLLING SALINITY IN THE RECLAMATION OF ARID LAND FOR AGRICULTURAL DEVELOPMENT IN WEST PAKISTAN. DISCUSSION INCLUDES VARIOUS HISTORICAL AND CURRENT ASPECTS OF WEST PAKISTAN'S DEVELOPMENT, A GEOGRAPHICAL DESCRIPTION, AND A CONSIDERATION OF ITS POPULATION AND RACES. WATER RESOURCES DEVELOPMENT PROJECTS IN PROGRESS NOW CONCENTRATE ON IRRIGATION CANALS AND DRAINAGE CHANNELS, THE DRILLING OF TUBE WELLS, AND THE CONSTRUCTION OF DAMS. THE USE OF AN ASPHALT MOISTURE BARRIER AND OF AN ASPHALT AND PETROLEUM MULCH FOR STABILIZING SAND DUNES IS CONSIDERED. A PROPOSAL FOR AN AGRO-CHEMICAL COMPLEX WITH EMPHASIS ON THE USE OF ASPHALT IS PRESENTED. LARGE AMOUNTS O· ASPHALT AND NATURAL SULFUR COULD BE USED IN DESERT RECLAMATION AND AGRICULTURAL DEVELOPMENT OF WEST PAKISTAN AND IN THE ARID AND SEMIARID LANDS OF INDIA, THE MIDDLE EAST, THE EAST COAST OF AFRICA, AUSTRALIA, AND CENTRAL AND SOUTH AMERICA.

PAKISTAN/OALS/ARID LANDS/DESERTS/WATER RESOURCES/SALINITY/INDUS BASIN/LAND RECLAMATION/LAND USE/IRRIGATION/IRRIGATION CANALS/ IRRIGATION PRACTICES/DRAINAGE/WELLS/DAMS/WATER RESOURCES DEVELOPMENT/ ASPHALT/WATER CONSERVATION/OIL/MULCHING/SAND CONTROL/SAND DUNES/ SULFUR /ECONOMIC DEVELOPMENT/SEMIARID CLIMATE

11

FLEMING, J.H.

1968

THE ASSESSMENT OF SURFACE RUNOFF FROM RAINFALL DATA FOR AN ARID REGION OF WEST PAKISTAN.

INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY, PUBLICATION 76:369-382. SWRA(2)W69-05232. MGA 20.10-754.

TO MAKE AN ASSESSMENT OF THE WATER RESOURCES OF THE KACHHI PLAIN, FLOOD RUNOFF FROM AN ARID MOUNTAINOUS CATCHMENT HAD TO BE ESTIMATED SINCE THERE WERE NO RELIABLE FLOOD DISCHARGE MEASUREMENTS, ALTHOUGH RAINFALL RECORDS WERE GOOD, SHOWING AN AVERAGE ANNUAL BETWEEN 4 AND 14 INCHES. SEPARATE RUNOFF COEFFICIENTS WERE ATTEMPTED FOR BOTH MONSOON AND NON-MONSOON SEASONS, RESULTING IN A GOOD APPROXIMATION. (OALS)

PAKISTAN/RAINFALL-RUNOFF RELATIONSHIPS/RAINFALL/RUNOFF/BALUCHISTAN/ INDUS BASIN/MONSOONS/SURFACE WATER RUNOFF/STREAMFLOW/INFILTRATION/ FLOODS/OALS

12

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)

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

13

FRENCH, N.H.

1968

RANGE MANAGEMENT, WEST PAKISTAN, 1962-1968.

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, RANGE MANAGEMENT ADVISER TO THE GOVERNMENT OF WEST PAKISTAN, REPORT. (PROCESSED)

RANGE MANAGEMENT/RANGES

14

GENTELLE, P.

1969

L'OASIS DE KHULM (THE KHULM OASIS).

ASSOCIATION DE GEOGRAPHES FRANCAIS, BULLETIN 370:383-393. GA 69D-1503.

THE KHULM OASIS IN AFGHANISTAN FORMS ONE OF MANY IN A 450 KM. PIEDMONT ZONE NORTH OF THE HINDU-KUSH CHAIN. PROBLEMS OF WATER SUPPLY ARE ACUTE. THE WATERS OF THE AMU-DARYA ARE NOT USABLE AND SUBTERRANEAN SOURCES ARE DIFFICULT TO REACH. A CANAL FROM THE AMU-DARYA MIGHT IMPROVE CONDITIONS BUT, AT PRESENT, ALL SUPPLIES ARE DERIVED FROM THE KHULM RIVER AND A SMALL LOCAL SPRING. HUMAN OCCUPANCE OF KHULM IS CONSIDERED TYPICAL OF THE OASES OF AFGHAN TURKESTAN. THE TOWN OF KHULM (TASHKURGHAN) WAS FOUNDED IN THE LATE 18TH CENTURY, REGROUPING THE POPULATION OF OLD VILLAGES AND HAMLETS LOCATED FURTHER NORTH. THIS WAS ALSO A PERIOD OF CANAL BUILDING. THE RIGOROUS CONTROL OF WATER SUPPLIES HAS FORMED A CENTRAL THEME IN THE REGION'S RECENT HISTORY.

AFGHANISTAN/OASES/WATER SOURCES/WATER RIGHTS/WATER MANAGEMENT/SOCIAL ASPECTS/ WATER SUPPLY/WATER ALLOCATION(POLICY)/SETTLEMENTS

15

HUSSAIN, S.S./QADIR, S.A.

1970

AN AUTECOLOGICAL STUDY OF EUPHORBIA CADUCIFOLIA HAINES.

VEGETATIO 20(5/6):329-380.

THE ENVIRONMENTAL FACTORS CONTROLLING THE DISTRIBUTION, GROWTH, ABUNDANCE AND SOCIABILITY OF E. CADUCIFOLIA WERE STUDIED IN THE AREA UP TO 70 MILES FROM KARACHI. PHENOLOGICAL OBSERVATIONS ON REPRODUCTION, VEGETATIVE GROWTH, AND DORMANCY WERE MADE. THE PLANT IS MOST ABUNDANT ON FLAT PLAINS, LESS ON SLOPES AND BANKS OF DRY STREAMS. GROWTH IS BEST ON SAND DUNES OF PLAINS, POOR ON HILLS, ESPECIALLY THEIR S SLOPES. THE PLANT USUALLY OCCURS IN CLUMPS, SINGLY ONLY IN THE HILLS. SOILS OVER 30 INCHES DEEP ARE MORE FAVORABLE THAN SHALLOW SOILS. SOIL ANALYSES ARE GIVEN. THE PLANT PROVIDES PROTECTION FOR MANY PLANTS. RAINFALL RESULTS IN PROFUSE GROWTH OF EPHEMERAL ANNUALS UNDER THE BUSHES OF E. CADUCIFOLIA. DUE TO THE EFFECTS OF WIND MOST GROW ON THE NORTH AND EAST SIDES OF THE BUSH. MATURE BRANCHES OF THE EUPHORBIA CANNOT REPRODUCE VEGETATIVELY, BUT SOME OF THE YOUNG BRANCHES CAN. RELATIVE WATER CONTENT OF THE PLANT IS HIGH SINCE IT IS A SUCCULENT. THERE WAS A HIGH GERMINATION PERCENTAGE FOLLOWING CHEMICAL TREATMENT AS WELL AS MECHANICAL SCARIFICATION, BUT SEEDS REMAIN VIABLE FOR ONLY 3 WEEKS.

PAKISTAN/OALS/AUTECOLOGY/PLANT ECOLOGY/PLANT DISTRIBUTION/PLANT GROWTH/PHENOLOGY/REPRODUCTION/MICROENVIRONMENT/SOIL TYPES/ SOIL-WATER-PLANT RELATIONSHIPS/WIND ACTION/EUPHORBIACEAE/SUCCULENTS/ GERMINATION/VIABILITY/LIFE HISTORY

16

KARPOV, A.V./NEBOLSINE, R.

1961

RIVERS AND DESERT.

INDUS, MONTHLY JOURNAL OF WATER AND POWER DEVELOPMENT AUTHORITY (LAHORE) 1:1-11.

TRACES THE DEVELOPMENT OF RIVERS AND DESERTS IN PAKISTAN AFTER THE FORMATION OF GREAT AND LESSER HIMALAYAN RANGES: FILLING OF THE INDOGANGETIC DEPRESSION; FORMATION OF SIWALIKS; BREAKING UP OF THE SIWALIK RIVER INTO A NUMBER OF SEPARATE CHANNELS; FORMING OF JHELUM, CHENAB, RAVI, BEAS AND SUTLEJ RIVERS AND A COMMON INDUS-GANGES VALLEY; RISING OF THE MIDDLE PORTION OF HIMALAYAS; REVERSAL OF THE GANGES AND JUMNA; AND DEPLETION OF THE WATER OF THE INDUS RIVER BASIN AND A GRADUAL SHIFTING TO THE WEST OF THE INDUS AND ITS DISTRIBUTARIES, CAUSING THE FORMATION OF THE INDIAN DESERT COVERING THE LARGEST PART OF THE FORMER COMBINED INDO-GANGETIC VALLEY.

RIVERS/DESERTS/MOUNTAINS/GEOMORPHOLOGY/THAR DESERT/RIVER BASINS/ CHANNEL MORPHOLOGY/DESERTIFICATION

17

KARPOV, A.V./NEBOLSINE, R.

1963

INDUS VALLEY, KEY TO WEST PAKISTAN'S FUTURE.

INDUS, MONTHLY JOURNAL OF WATER AND POWER DEVELOPMENT AUTHORITY (LAHORE) 12:1-10.

IN GEOLOGICAL TERMS, INDUS RIVER IS YOUNG, BUT IT HAS WITNESSED OLD CIVILIZATIONS. THE LOWER PART OF THE VALLEY HAD IN THE PAST AN ABUNDANCE OF WATER AND WAS POPULATED AND PROSPEROUS OVER 2000 YEARS AGO. AGRICULTURE COULD BE PRACTICED WITHOUT EXCESSIVE EFFORT TO IMPROVE THE NATURAL CONDITION. THE WATER SUPPLY OF THE INDUS VALLEY DIMINISHED; THE ENVIRONMENT BECAME LESS FAVORABLE; THE POPULATION GRADUALLY DWINDLED AND DISPERSED; AND THE OLD CIVILIZATION DISAPPEARED. THE HYDROLOGY OF THE VALLEY TODAY IS QUITE DIFFERENT FROM THE PAST. THE PAPER DISCUSSES THE GEOLOGY OF THE REGION, MOVEMENT OF MATERIALS OVER THE PLAIN, AND COURSES OF THE INDUS-GANGES THROUGH THE DESERT.

INDUS BASIN/WATER SHORTAGE/ENVIRONMENTAL EFFECTS/RIVERS/GEOLOGY/SOCIAL ASPECTS

18

KHAN, M.L.

1960

RECENT PLUVIOMETRIC CHANGES IN THE ARID AND SEMIARID ZONES OF WEST PAKISTAN.

PAKISTAN GEOGRAPHICAL REVIEW 15(1):1-24.

A MATHEMATICAL ANALYSIS OF ALL AVAILABLE RAINFALL DATA IN AN ATTEMPT TO PROJECT PRECIPITATION TRENDS IN THE ARID AREAS OF WEST PAKISTAN.

RAINFALL/WEATHER DATA/WEATHER PATTERNS

19

MALIK, S.K.

1970

SURFACE WATER EVALUATION WITH LIMITED DATA IN THE ARID REGION OF WEST PAKISTAN.

CENTRAL TREATY ORGANIZATION SEMINAR ON EVALUATION OF WATER RESOURCES WITH SCARCE DATA 1969, TEHRAN, IRAN, PROCEEDINGS, P. 471-487. SWRA W71-02800.

THE TOTAL ANNUAL FLOW OF THE COASTAL AND DESERT STREAMS IN THE 134, 700 SQUARE MILES OF THE ARID REGION OF WEST PAKISTAN AVERAGES BETWEEN 4 AND 5 MILLION ACRE FEET. FOR EVALUATION OF SURFACE WATER RESOURCES IN THIS ARID REGION, A NUMBER OF RAIN GAGES, AND SOME AUTOMATIC RAIN RECORDERS HAVE BEEN SET UP. STREAM GAGING STATIONS HAVE ALSO BEEN SET UP COVERING THE IMPORTANT STREAMS OF THE AREA. EVAPORATION PANS HAVE ALSO BEEN ERECTED TO MEASURE LAKE EVAPORATION IN SOME AREAS. PRINCIPLES AND PROCEDURES OF THE EVALUATION ARE DISCUSSED IN THE ANALYSIS OF PRECIPITATION DATA AND STREAM GAGINGS, STAGE-DISCHARGE RELATIONS OF THE STREAMS, THE FORMULATION OF RAINFALL-RUNOFF RELATIONS, AND ESTIMATION OF THE SEDIMENT LOADS OF THE STREAMS WHICH GIVE AN INDICATION OF THE SOIL LOSS TAKING PLACE FROM THE WATER-BORNE RIVER CATCHMENTS. (USGS)

PAKISTAN/ARID LANDS/DALS/PRECIPITATION(ATMOSPHERIC)/HYDROLOGIC DATA/ STREAM GAGES/RUNOFF/WATER RESOURCES/SURFACE WATER RUNOFF/TOPOGRAPHY/ RAINFALL-RUNOFF RELATIONSHIPS/SURFACE-GROUNDWATER RELATIONSHIPS/ STREAMFLOW/SEDIMENT YIELD

20

MEHER, H.

1971

ON THE MEDITERRANEAN CLIMATIC REGIONS OF WEST PAKISTAN.

ARCHIV FUER METEOROLOGIE, GEOPHYSIK, UND BIOKLIMATOLOGIE, SER. B, 19(3): 277-286.

LISTING OF STATIONS OF WEST PAKISTAN SUBJECT TO A MEDITERRANEAN CLIMATE: MILD WINTER, RAINFALL DURING THE COOL SEASON OF THE YEAR, AND SUMMER DROUGHT. DEGREES OF MEDITERRANEITY ARE RECOGNIZED ON THE BASIS OF INTENSITY OF ESTIVAL DRYNESS (SUMMER RAINFALL AS PERCENTAGE OF THE TOTAL). THREE CATEGORIES ARE RECOGNIZED AND MAPPED OUT: PURE MEDITERRANEAN (E.G., NOKUNDI, NO SUMMER RAINFALL); MODERATE (<40 PERCENT SUMMER RAINS ON AN AVERAGE, E.G., QUETTA, KALAT); AND ATTENUATED (>40 PERCENT RAINFALL IN HOT SEASON), MARKING A TRANSITION TOWARDS TROPICAL OR BISERIC CLIMATES (E.G., FORT SANDEMAN, DERA ISMAIL KHAN).

MEDITERRANEAN CLIMATE/CLIMATIC DATA/RAINFALL/RAINFALL STATIONS/DRY SEASONS/ WINTER PRECIPITATION/SUMMER PRECIPITATION

21

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.

PAKISTAN/OALS/AFGHANISTAN/IRAN/IRANIAN DESERT/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

22

MUHAMMAD, K.

1952

A NOTE ON THE AFFORESTATION OF SHIFTING SAND DUNES AREA IN THE THAL (DESERT) AREA OF THE PUNJAB.

PAKISTAN JOURNAL OF FORESTRY 2:276-279.

BASIN IRRIGATION DURING THE ANNUAL STORMY PERIOD HAS BEEN EFFECTIVE IN LEVELLING DUNES AND IMPROVING THE SAND BY SILT DEPOSITION. WHERE IRRIGATION WATER IS NOT AVAILABLE, STABILIZATION IS SUCCESSFULLY EFFECTED BY PLANTING CALLIGONUM SPP. AND CALOTROPIS PROCERA. SUITABLE PLANTS AND TREES FOR STABILIZING WATER COURSES ARE LISTED.

OALS/PUNJAB/SOIL STABILIZATION/SAND CONTROL/DUNES/INDIA/VEGETATION ESTABLISHMENT/DEPOSITION(SEDIMENTS)/SILTS/IRRIGATION/AFFORESTATION

23

NAQVI, S.N.

1958

DESALINIZATION OF SEA WATER BY USING WIND AND SOLAR ENERGY FOR DEVELOPMENT OF MARINE DESERT NEAR KARACHI.

PAKISTAN METEOROLOGICAL DEPARTMENT. (PROCESSED)

COASTAL DESERTS/SOLAR ENERGY/WIND POWER/DESALINATION

24

NAQVI, S.N.

1958

PERIODIC VARIATIONS IN WATER BALANCE IN AN ARID REGION: A PRELIMINARY STUDY OF 100 YEARS' RAINFALL AT KARACHI.

UNESCO, PARIS. ARID ZONE RESEARCH 11:326-345.

RAINFALL/WEATHER DATA/WATER BALANCE/SOLAR RADIATION/CLIMATOLOGY/ WEATHER PATTERNS

25

RAHMAN, M.

1968

FORMEN DER BEWAESSERUNG IM SIND, WEST-PAKISTAN (SYSTEMS OF IRRIGATION PRACTICED IN SIND, WEST PAKISTAN).

ERDE 99(2):163-175.

IN THE FORMER PROVINCE OF SIND, WEST PAKISTAN, IRRIGATION APPEARS TO BE AS OLD AS AGRICULTURE. THE ARCHAEOLOGICAL REMAINS HELP TO DATE SUCH PRACTICES TO ABOUT 6000 YEARS IN ANTIQUITY. CONTINUED IRRIGATION PRACTICES DURING THIS PERIOD LED TO THE EVOLUTION OF VARIOUS METHODS OF IRRIGATION, AS WELL AS SOME INTRODUCED BY INCOMING CULTURES. THIS PAPER PRESENTS ALL SUCH PREVALENT SYSTEMS OF IRRIGATION, THEIR DISTRIBUTION, RELATIVE IMPORTANCE, AND CULTURAL HISTORY. AN EFFORT HAS ALSO BEEN MADE TO GIVE THE GERMAN AND ENGLISH EQUIVALENTS OF THE LOCAL TERMS, IN CONNECTION WITH THE INTERNATIONAL GLOSSARY OF TERMS IN AGRICULTURE GEOGRAPHY, BEING PREPARED AT THE GEOGRAPHY INSTITUTE OF THE UNIVERSITY OF GIESSEN.

PAKISTAN/IRRIGATION/IRRIGATION PRACTICES/ARCHAEOLOGY/HISTORY/OALS

26

RAIKES, R.L.

1963

THE END OF THE ANCIENT CITIES OF THE INDUS CIVILIZATION IN SIND AND BALUCHISTAN.

AMERICAN ANTHROPOLOGIST 65(3):655-659.

BALUCHISTAN/ARCHAEOLOGY/HISTORY/URBAN AREAS

27

PABOT, H.

1959

AMELIORATION DES PATURAGES NATURELS; RAPPORT AU GOUVERNEMENT DE L'AFGHANISTAN.

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, ROME, EPTA REPORT 1093. 57 P.

AFGHANISTAN/PASTURES/LAND RECLAMATION

28

PIAS, J.

1971

LES LOESS EN AFGHANISTAN ORIENTAL ET LEURS PEDOGENESES SUCCESSIVES AU QUATERNAIRE RECENT (LOESS FROM EASTERN AFGHANISTAN AND ITS SUCCESSIVE PEDOGENESES DURING THE HOLOCENE).

ACADEMIE DES SCIENCES, COMPTES RENDUS 272D(12):1602-1605.

AFGHANISTAN/LOESS/SOIL FORMATION/HOLOCENE EPOCH/PALEOSOLS

29

PIAS, J.

1972

SOLS D'AFGHANISTAN: PEDOGENESES ANCEINNES ET ACTUELLES (SOILS OF AFGHANISTAN: ANCIENT AND PRESENT-DAY PEDOGENESIS).

REVUE DE GEOGRAPHIE PHYSIQUE ET DE GEOLOGIE DYNAMIQUE 14(4):433-442.
GA 73A-2147.

THE STUDIES WERE UNDERTAKEN IN REGIONS DIFFERENTIATED BY THEIR ALTITUDE, GEOGRAPHICAL POSITION AND CLIMATIC CONDITIONS. THE LATTER SEEM TO HAVE HAD A WEAK IMPACT ON THE SOILS DATING FROM THE LAST WUERM GLACIAL PERIOD (35,000 TO 10,000 YEARS B.P.) DURING WHICH SOME IMPORTANT LIMESTONE ACCUMULATIONS OCCURRED (CALCAREOUS CRUSTS, CRUST FORMATION, TRAVERTINE DAMS, LACUSTRINE LIMESTONES AND DOLOMITIC DEPOSITION). SOILS FORMED MORE RECENTLY HAVE UNDERGONE LESS MARKED PEDOGENESIS (CLASSIFIED AS WEAKLY DEVELOPED SOILS) OR A RAPID EVOLUTION GIVING HYDROMORPHIC SOILS WITH A REDISTRIBUTION OF LIMESTONES UNDER WATER ACTION, SOILS WITH GYPSUM CRUSTS, AND HALOMORPHIC SOILS. AT HIGH ALTITUDES CALCIUM CARBONATE MIGRATION IS STILL ACTIVE IN SOILS ON LIMESTONE BEDROCK WITH PERIGLACIAL SOILS DEVELOPMENT. (AFTER ENGLISH SUMMARY)

AFGHANISTAN/SOIL TYPES/PALEOSOLS/SOIL FORMATION/LIMESTONE/CALCAREOUS SOILS/DOLOMITES/CRUSTS/HALOMORPHIC SOILS

30

PITHAWALLA, M.B.

1952

THE GREAT INDIAN DESERT, A GEOGRAPHIC STUDY. IN SYMPOSIUM ON THE RAJPUTANA DESERT, PROCEEDINGS.

NATIONAL INSTITUTE OF SCIENCES, INDIA, BULLETIN 1:137-150.

INDIA/THAR DESERT/REGIONAL GEOGRAPHY

31

PLANHOL, X. DE

1968

NOMADES ET PASTURES: NOMADS DU GRAND DESERT, WEST PAKISTAN.

REVUE GEOGRAPHIQUE 8(3-4):363-374.

NOMADS/PASTURES

32

RAHMAN, M.

1966

KUNSTVANDING MED OSEVOERKET NAR I VEST PAKISTAN (NAR-WELL IRRIGATION IN WEST PAKISTAN).

KULTURGEOGRAFI 99:325-330.

BASED ON ETYMOLOGICAL AND RELATED EVIDENCE, THE ORIGIN AND DIFFUSION OF NARS (ERRONEOUSLY CALLED PERSIAN WHEELS) HAS BEEN TRACED. THIS WAS THE MOST EFFECTIVE WATER LIFTING DEVICE FOR IRRIGATION UNTIL THE INVENTION OF CENTRIFUGAL PUMPS. ARABS ARE SAID TO HAVE ORIGINATED THE DEVICE IN LATE 600 A.D., AND TO HAVE INTRODUCED IT TO OTHER ARID AREAS, INCLUDING WEST PAKISTAN, AFTER 712 A.D., WHEN SIND WAS SUBJUGATED BY THE ARABS. THE FORM, CONSTRUCTION, AND SIZES OF THE NARS ARE DISCUSSED TO SUPPORT THE CONTENTION THAT THIS DEVICE HAS SURVIVED TO THE PRESENT DAY IN WEST PAKISTAN WITHOUT FUNDAMENTAL CHANGE.

IRRIGATION PRACTICES/HISTORY/IRRIGATION WELLS

33

RAIKES, R.L.

1961

THE PREHISTORIC CLIMATES OF BALUCHISTAN AND THE INDUS VALLEY.

AMERICAN ANTHROPOLOGIST 63(2):265-281.

THIS STUDY IS THE OUTCOME OF HYDROGRAPHIC FIELD STUDIES MADE BY THE AUTHOR, AND ARCHAEOLOGICAL FIELD STUDY OF INDUS SITES MADE BY R.H. DYSON DURING 1957. THE STUDY REFUTES THE ARCHAEOLOGICAL BELIEF OF PROGRESSIVE DESICCATION OF THE CLIMATE SINCE THE INDUS VALLEY CIVILIZATION ABOUT 5000 YEARS AGO. ARGUMENTS GIVEN BY THE ARCHAEOLOGISTS IN SUPPORT OF MORE RAINY CLIMATE ARE REVIEWED, AND COUNTER ARGUMENTS ARE ADVANCED TO PROVE THAT THERE HAS BEEN NO SIGNIFICANT CHANGE IN THE CLIMATE.

BALUCHISTAN/INDUS BASIN/ARCHAEOLOGY/PALEOCLIMATOLOGY/CLIMATIC CHANGE

34

RAMSWAMY, C./KAILASNATHAN, K.

1971

PROLONGED SPELLS OF NONCONVECTIVE SAND STORMS IN THE RAJASTHAN DESERT DURING THE SW MONSOON PERIOD.

VAYA MANDAL 1(2):78-83.

OBSERVATIONAL DATA OF WEST RAJASTHAN (PAKISTAN AND INDIA) FOR THE PERIOD 1901-1970 WAS STUDIED BY THE AUTHORS. ACCORDING TO THEIR INVESTIGATIONS, OCCURRENCES OF SEVERE SAND STORMS IN THE RAJASTHAN DESERT WERE AS SEVERE AND PROLONGED AS THAT OF JULY 1970. BASIC CAUSES OF THIS STORM AND OF SIMILAR STORMS IN THE MONSOON MONTHS, AND THE PREDICTION OF SUCH SEVERE STORMS WERE STUDIED. THE ASSOCIATED AVERAGE MEAN WIND SPEEDS AND SEA LEVEL PRESSURE PATTERNS ARE CITED. TYPES OF SEA LEVEL PRESSURE PATTERNS ASSOCIATED WITH NONCONVECTIVE SANDSTORMS IN JULY 1901-1970, NONCONVECTIVE SAND STORMS IN AUGUST, AND THE FORECASTING OF PROLONGED SPELLS OF SANDSTORMS IN THE MONSOON SEASON ARE DISCUSSED. THE SEVERE SAND STORM OF JULY 1970 WAS NONCONVECTIVE. SAND STORMS OF THIS TYPE ARE ASSOCIATED WITH DEEP PRESSURE GRADIENTS IN THE REAR OF A PRONOUNCED RIDGE OF PRESSURE AT SEA LEVEL. THE DEVELOPMENT OF THE RIDGE ITSELF IS ASSOCIATED WITH THE SHIFTING OF THE WESTERN END OF THE AXIS OF THE MONSOON TROUGH TOWARDS THE HIMALAYAS AND FOR THE ACCENTUATION OF THE SEASONAL LOW OVER WEST PAKISTAN, SO THAT A LOW PRESSURE CELL DEVELOPS TO THE NORTH OF THE NORMAL POSITION OF THE NORMAL SEASONAL LOW OVER WEST PAKISTAN.

INDIA/RAJASTHAN/DUST STORMS/FORECASTING/ATMOSPHERIC PRESSURE/WEATHER DATA/ WIND VELOCITY/WEATHER PATTERNS/MONSOONS

35

REVELLE, R.

1964

MISSION TO THE INDUS.

NEW SCIENTIST (LONDON) 17(326):340-342.

A GROUP OF AMERICAN SCIENTISTS LED BY ROGER REVELLE STUDIED THE PROBLEMS OF WATERLOGGING AND SALINITY OF IRRIGATED FARMLAND AREAS OF THE INDUS BASIN IN WEST PAKISTAN. THE LONG-TERM EFFECTS OF AN EXTENSIVE IRRIGATION PROGRAM CAUSED A RISE IN THE WATER LEVEL AND AN INCREASE IN THE SALINITY OF SOIL OVER A LARGE TRACT OF FARMLAND, RENDERING IT UNPRODUCTIVE. THE SOLUTION PROPOSED IS TO DIVIDE THE BASIN INTO AREAS OF ABOUT A MILLION ACRES AND WITHIN EACH AREA DRILL A LARGE NUMBER OF TUBE WELLS, DRAWING WATER UP TO THE SURFACE. IN THE PANJAB AREA THIS WOULD BE ALLOWED TO FLOW ONTO THE SURFACE CAUSING THE RATE OF EVAPORATION TO GO UP WHICH WOULD, IN TIME, LEAD TO A LOWERING WATERTABLE. THE INCREASED RATE OF INFILTRATION OF WATER THROUGH THE SOIL WOULD LEACH OUT THE SALTS ON THE SURFACE. IN THE LOWER PART OF THE BASIN WATER WOULD BE CHANNELED DIRECTLY INTO THE INDUS RIVER ITSELF. SUCH A SCHEME CAN ONLY WORK IF A SUFFICIENTLY LARGE AREA IS TACKLED AT A TIME, HENCE THE SUGGESTED MILLION ACRES.

INDUS BASIN/IRRIGATION EFFECTS/SALINE SOILS/WATER LEVELS/SATURATED SOILS/ WATER MANAGEMENT/LAND RECLAMATION

36

SNEAD, R.E.

1966

PHYSICAL GEOGRAPHY RECONNAISSANCE: LAS BELA COASTAL PLAIN, WEST PAKISTAN.

LOUISIANA STATE UNIVERSITY, BATON ROUGE, COASTAL STUDIES SERIES 13. 118 P.

THIS STUDY IS A DESCRIPTION OF ARID LAS BELA COASTAL PLAIN, AND AN INTERPRETATION OF THE PHYSICAL CHANGES IT HAS UNDERGONE DURING THE QUATERNARY PERIOD. THE LAS BELA VALLEY IS A STRUCTURAL TROUGH IN THE ALPINE-HIMALAYAN GEOSYNCLINAL BELT WHERE THICK MARINE SEDIMENTS HAVE ACCUMULATED FROM PALEOZOIC TO TERTIARY TIMES. LATE IN THE CENOZOIC ERA, THE ENTIRE REGION UNDERWENT VIOLENT OROGENY RESULTING IN THE FOLDED AND FAULTED MOUNTAIN-FORMING ON THE EAST AND WEST SIDES OF THE VALLEY. DURING THE PAST MILLION YEARS, ALTERNATE EROSION AND FILLING IN THE VALLEY OCCURRED DURING MAJOR GLACIATION TIMES AND INTERGLACIAL STAGES. FROM ABOUT 18000 TO 5000 YEARS AGO, SEA LEVEL ROSE AND COVERED THE LOWER PORTION OF THE LAS BELA COASTAL PLAIN. A SAND DUNE ACCUMULATION AROUND THE NORTH END OF MIANI LAGOON WAS FORMED ALONG WHAT IS NOW THE INNER SHORELINE. DURING THE PAST 5000 YEARS PROGRADATION OF THE COASTAL PLAIN HAS TAKEN PLACE. A SERIES OF BEACH RIDGES AND SPITS WERE BUILT FROM 5 TO 8 MILES SEAWARD OF THE INNER SHORELINE. DURING THE LAST 30 YEARS, COASTAL GROWTH APPEARS TO HAVE SLOWED DOWN IN PLACES.

LAS BELA COASTAL PLAIN/PLAINS/QUATERNARY PERIOD/GEOMORPHOLOGY/COASTS/SHORES/ SAND DUNES

37

SNEAD, R.E.

1968

WEATHER PATTERNS IN SOUTHERN WEST PAKISTAN.

ARCHIV FUER METEOROLOGIE, GEOPHYSIK, UND BIOKLIMATOLOGIE, SER. B, 16(4):316-346. SWRA W70-01197.

THE AREA IS ONE OF TRANSITION BETWEEN THE INDIAN SUMMER MONSOON SYSTEM TO THE EAST, AND THE WINTER CYCLONIC SYSTEM OF SOUTHWEST ASIA TO THE WEST, AND AS SUCH RECEIVES SCANTY, UNRELIABLE RAINFALL AVERAGING LESS THAT 254 MM PER YEAR FROM SEVERAL STORM TYPES. SIX MAIN WEATHER PATTERNS CROSS THE REGION: LARGE SUBTROPICAL ANTICYCLONIC HIGH PRESSURE CELL THAT PREDOMINATES MOST OF THE YEAR; WESTERN DEPRESSIONS ORIGINATING OVER THE MEDITERRANEAN; ARABIAN SEA CYCLONES; LOCAL THUNDERSTORMS AND DUST STORMS; A MODIFIED MONSOON PATTERN; AND EASTERN DEPRESSIONS ORIGINATING OVER THE BAY OF BENGAL OR CENTRAL INDIA.

PAKISTAN/KWIC MF 7350/WEATHER PATTERNS/CYCLONES/DUST STORMS/MONSOONS/ RAINFALL/ANTICYCLONES/THUNDERSTORMS/SYNOPTIC CLIMATOLOGY/OALS

38

SNEAD, R.E./FRISHMAN, S.A.

1968

ORIGIN OF SANDS ON THE EAST SIDE OF THE LAS BELA VALLEY, WEST PAKISTAN.

GEOLOGICAL SOCIETY OF AMERICA, BULLETIN 79:1671-1676. AVAILABLE NTIS AS AD-682 820.

THE LARGE SAND COMPLEX IN THE AREA IS THOUGHT TO HAVE BEEN DERIVED FROM THE NEARBY MOUNTAIN RANGES RATHER THAN FROM AN EXPOSED CONTINENTAL SHELF. SEA LEVEL CHANGES AND RECENT TECTONISM COMPLICATE THE SEQUENCE OF EVENTS.

PAKISTAN/COASTAL PLAINS/SANDS/TECTONICS/BALUCHISTAN/ARABIAN SEA/LAS BELA COASTAL PLAIN/OALS

39

TAYLOR, G.C.

1965

WATER, HISTORY, AND THE INDUS PLAIN.

NATURAL HISTORY 74(5):40-49.

HISTORY/WATER RESOURCES/PLAINS/INDUS BASIN

40

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.

MEIGS AC14/OALS/AFGHANISTAN/IRAN/DESERTIFICATION/SAND DESERTS/PLAINS/ TEMPERATURE RANGES/IRANIAN DESERT/HELMAND RIVER/BASINS/DUST STORMS

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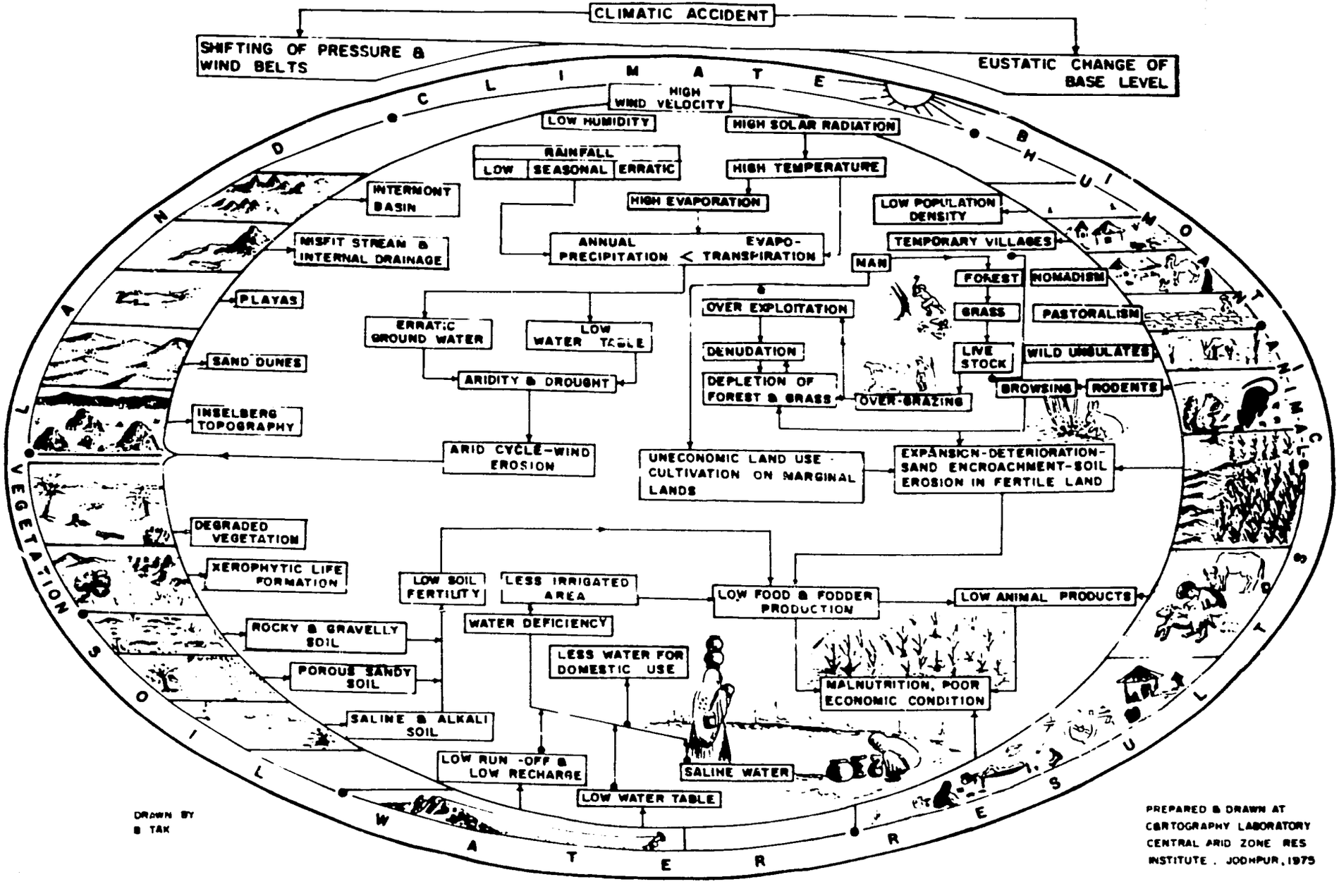
# INDIA

# DESERTIFICATION

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CENTRAL ARID ZONE RES
INSTITUTE . JODHPUR, 1975

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Jodhpur
India

## INDIA

The Indian (or Thar) Desert extends over four Indian states and into Pakistan. Subjected to marine transgressions in the past, it now presents interesting geomorphic formations. In the more recent past, this desert has sustained well-developed civilizations, particularly in the Ghaggar and Indus River basins. In spite of the paucity of water, erratic rainfall, extremes of temperatures, and the fact that it is probably the least productive land in the Indian sub-continent, it is one of the most heavily populated deserts in the world. Average density is 46 persons per km compared to 3 in most other desertic areas. Moreover, growth rate of the human population during the period 1901-1971 has been 158 percent in contrast to 125 percent in the adjacent area. Added to this, in the desert districts of Rajasthan we have an enormous livestock population as well, some 13 million, increasing also at an alarming rate. Beyond these factors, the desert is subject to severe pressure from wild ungulates and rodents.

Mean annual rainfall of the region varies from 150 to 500 mm, with a coefficient of variation as high as 60-70 percent. The distribution of rainfall is erratic, occurring mostly during July-September. Droughts are frequent. The highest summer temperatures range from 44 to 50°C; winter temperatures sometimes drop to -5°C. Despite the adverse environment, the desert maintains a highly productive flora (over 530 species) well adapted to the xeric conditions, including vast natural grasslands of Lasiurus sindicus and Cenchrus spp. characteristic of this desert. Nevertheless, pastures and browse-shrubs have reached a stage of severe degradation because of overgrazing by livestock and the activities of rodents, and plant density has dropped from 112-415/ha to 6-18/ha. Frequency of perennial nutritive grasses has been drastically reduced, and annuals which are inedible or unpalatable have invaded the arid areas, severely decreasing their biomass productivity. Soils have simultaneously become degraded, and at certain localities salinity and alkalinity problems are aggravated. To cope with increasing human pressure, marginal lands are being cultivated and the fertility of the land is deteriorating further.

The major problems of the Indian Desert are the shifting sand dunes and dust storms in summer months, the search for exotic plants for their stabilizing effect, compilation of inventories and preparation of development programs for natural resources, maximum use of scanty rainfall, development of early-maturing crops with low water requirements, optimum management of ranges, livestock, and pests, and a resolution of the problems of nomadism.

This bibliography reflects work done in the Indian arid zone from 1964-1974, especially on desertification and de-desertification, which is directly or indirectly related to these problems.

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* Dr. Mann is grateful to Mr. AminUllah, Jr., Librarian, Central Arid Zone Research Institute, Jodhpur, for his assistance in compiling this bibliography. But for his support and willing cooperation, this task would not have been possible.

# INDIA

ABICHANDANI, C.T./ROY, B.B.

1966

RAJASTHAN DESERT: ITS ORIGIN AND AMELIORATION.

INDIAN GEOGRAPHICAL JOURNAL 41(3-4):35-43.

GEOLOGICAL, ARCHAEOLOGICAL, HISTORICAL, CLIMATOLOGICAL AND PHYSIOGRAPHIC EVIDENCES FOR THE ORIGIN OF THIS DESERT AND MEASURES FOR IMPROVEMENT OF ITS DESERTIC CONDITIONS.

RAJASTHAN/GEOLOGY/ARCHAEOLOGY/HISTORY/PALEOCLIMATOLOGY/LAND RECLAMATION

2

AHUJA, L.D.

1970

FORAGE PRODUCTION IN ARID ZONE AREAS OF RAJASTHAN.

INDIAN FARMING 20(9):18-21. HA 42(4)2519.

THE METHODS SUGGESTED FOR INCREASING FODDER PRODUCTION ON NATURAL RANGELANDS INCLUDE PROTECTION OF RANGELANDS FROM HEAVY GRAZING BY FENCING, ERADICATION OF THORNY BUSHES AND POISONOUS PLANTS, ADOPTION OF SOIL CONSERVATION MEASURES SUCH AS CONTOUR FURROWS AND STABLIZATION OF SAND DUNES, AND RESOWING RANGELANDS WITH HIGH-YIELDING AND DROUGHT-RESISTANT SPECIES SUCH AS DICHANTHIUM ANNULATUM, CENCHRUS CILIARIS, LASIURUS SINDICUS, CYAMOPSIS TETRAGONOLOBA, PENNISETUM TYPHOIDES, SORGHUM VULGARE, PHASEOLUS ACONITIFOLIUS, VIGNA SINENSIS [V. UNGUICULATA] AND DOLICHOS LABLAB [LABLAB PURPUREUS]. THE ROLE OF BROWSE TREES SUCH AS ZIZYPHUS NUMMULARIA, ACACIA SPECIES, SALVIDORA SPECIES, CALLIGONUM POLYGONOIDES, PROSOPIS CINERARIA, P. JULIFLORA, HALOXYLON SALICORNICUM AND TAMARIX ARTICULATA AS FEED SOURCES DURING MONTHS OF FODDER SCARCITY IS DESCRIBED.

OALS/FORAGE PRODUCTION/RAJASTHAN/ARID LANDS/GRAZING/FORAGE PLANTS/ RANGE MANAGEMENT/BRUSH CONTROL/NOXIOUS PLANTS/SOIL CONSERVATION/ CONTOUR FURROWS/SAND CONTROL/DESERT PLANTS/BROWSE/FOOD SUPPLY

AMINULLAH COMP.

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.

KWIC IP 2/OALS/BIBLIOGRAPHIES/DESERTIFICATION/INDIA/RAJASTHAN DESERT/ DESERT PLANTS/GRASSLAND BIOME/PLANT ECOLOGY/LIVESTOCK/RANGE MANAGEMENT

BASU, S. ET AL

1966

GEOLOGY AND GROUNDWATER CONDITIONS OF PARTS OF RAJASTHAN.

INDIA, GEOLOGICAL SURVEY, BULLETIN, SER. B, ENGINEERING GEOLOGY AND GROUND-WATER 20. 82 P. MAP. BIGENA 32(2)E68-01620.

EXPLORATORY DRILLING IN NORTHWESTERN RAJASTHAN ENCOUNTERED ABUNDANT GROUND-WATER IN THICK AQUIFERS IN THE JURASSIC LATHI SANDSTONES OF THE CHANDHAN AREA. THE REGION IN GENERAL IS HIGHLY UNFAVORABLE, WITH AN AVERAGE ANNUAL PRECIPITATION OF LESS THAN 10 INCHES AND GENERALLY LOW PERMEABILITY OF FORMATIONS. GEOLOGIC INVESTIGATION WAS HANDICAPPED BY THE BLANKET OF EOLIAN SANDS CONCEALING THE BEDROCK GEOLOGY OF 93 PERCENT OF THE REGION. EVAPORITE DEPOSITS COVER LARGE AREAS. THE CHEMICAL QUALITY OF GROUNDWATER OF THE REGION GENERALLY WAS POOR, RANGING FROM BRACKISH TO SALINE, BUT LOCALLY, AS IN THE SIKAR AREA, THE WATER WAS FRESH, WITH ONLY 23 PPM CHLORIDE.

RAJASTHAN/GEOLOGY/GROUNDWATER/WATER QUALITY/AQUIFERS/EVAPORITES/SALINE WATER

5

BHIMAYA, C.P.

1952

THE RAJASTHAN DESERT, AN APPRAISAL OF ITS PROBLEMS AND THE PROGRAMME FOR ITS IMMOBILIZATION. IN SYMPOSIUM ON SOIL EROSION AND ITS CONTROL IN THE ARID AND SEMI-ARID ZONES, KARACHI, 1967, PROCEEDINGS, P. 309-312.

FOOD AND AGRICULTURAL COUNCIL, KARACHI, MINISTRY OF FOOD AND AGRICULTURE. 400 P.

RAJASTHAN/SOIL EROSION/EROSION CONTROL/PLANNING

BHIMAYA, C.P./AHUJA, L.D.

1969

CRITERIA FOR DETERMINING CONDITION CLASS OF RANGELANDS IN WESTERN RAJASTHAN.

ANNALS OF ARID ZONE 8(1):73-79. HA 41(2)1264.

NATURAL GRASSLANDS IN THE SEMI-ARID AND ARID AREAS OF W. RAJASTHAN WERE CLASSIFIED INTO EXCELLENT, GOOD, FAIR OR POOR CONDITION ON THE BASIS OF THEIR BOTANICAL COMPOSITION. DECREASE IN CONDITION FROM EXCELLENT TO POOR WAS ACCOMPANIED BY A DECREASE IN PLANT COVER FROM >50 PERCENT TO <10 PERCENT, BY DECREASE IN PERENNIAL GRASSES, BY INCREASE IN ANNUAL GRASSES, AND BY A DECREASE IN THE YIELD.

RAJASTHAN/RANGES/GRASSES/PLANT COMMUNITIES/PLANT ECOLOGY/RANGE GRASSES/ LAND CLASSIFICATION

7

BHIMAYA, C.P./KAUL, R.N.

1960

SOME AFFORESTATION PROBLEMS AND RESEARCH NEEDS IN RELATION TO EROSION CONTROL IN ARID AND SEMI-ARID PARTS OF RAJASTHAN.

INDIAN FORESTER 86(6):453-468.

RAJASTHAN/AFFORESTATION/EROSION CONTROL

8

BHIMAYA, C.P./KAUL, R.N./GANGULI, B.N.

1961

SAND DUNE REHABILITATION IN WESTERN RAJASTHAN.

WORLD CONGRESS OF FORESTRY, 5TH, PROCEEDINGS, P. 358-363.

RAJASTHAN/SAND DUNES/LAND RECLAMATION/EROSION CONTROL

9

BISWAS, K./RAO, R.S.

1953

RAJPUTANA DESERT VEGETATION.

NATIONAL INSTITUTE OF SCIENCES OF INDIA, PROCEEDINGS 19(3):411-421.

ON THE BASIS OF RAINFALL THE AUTHORS DIVIDE THE DESERT INTO THREE ZONES: THE TRUE DESERT, THE ARID ZONE, AND THE SEMIARID ZONE. VEGETATION IS ENUMERATED UNDER THREE EDAPHIC TYPES: SAND, GRAVEL, AND ROCK COMMUNITIES.

RAJASTHAN/VEGETATION/DESERT PLANTS/PLANT COMMUNITIES/CLIMATIC ZONES

10

BLAGOVESHCHENSKIY, E.N.

1968

THE DRY SAVANNA OF NORTHWEST INDIA.

SOVIET GEOGRAPHY: REVIEW AND TRANSLATION 9(6):519-537. GA 69B-552.
[TRANSLATED FROM PROBLEMY OSVOYENIYA PUSTYN' 1:24-39, 1967.]

RESEARCH IN WESTERN RAJASTHAN SHOWED THAT THE DOMINANCE OF A SINGLE PLANT FORMATION COULD LARGELY BE ATTRIBUTED TO UNIFORM TEMPERATURE AND MOISTURE CONDITIONS. THE MESQUITE SAVANNA OF NORTHWEST INDIA REPRESENTS A BOTANICAL TRANSITION BETWEEN THE DESERT AND TRUE SAVANNA SIMILAR TO THE SAHEL BETWEEN THE SAHARA AND THE SUDAN. DETAILED STATISTICS ARE GIVEN OF AN INTENSIVE STUDY OF AN AREA WEST OF JODHPUR, THAR TO ESTABLISH THE SOIL PROPERTIES WHICH FAVOR THE GROWTH OF PROSOPSIS SPICIGERA.

RAJASTHAN/SAVANNA/PLANT ECOLOGY/CLIMATIC-VEGETAL RELATIONSHIPS/PROSOPIS/SOIL SURVEYS/SOIL TYPES

11

BRYSON, R.A./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. MGA 18.8-198.

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 SUBSISDENCE OVER THE DESERT. ARCHEOLOGICAL 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 SUBSISDENCE AND PRECIPITATION PATTERNS IN THE REGION. THE SOCIAL CONSEQUENCES OF SUCH CLIMATIC MODIFICATION ARE BRIEFLY CONSIDERED.

THAR DESERT/SUBSISDENCE/AIR POLLUTION/ARCHAEOLOGY/DESERTIFICATION/ ENVIRONMENTAL IMPACT/EROSION CONTROL/LAND RECLAMATION/CLIMATIC CHANGE/ WEATHER MODIFICATION

12

CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR

1964

RECENT DEVELOPMENTS IN RAJASTHAN. [SOUVENIR VOLUME ISSUED ON THE OCCASION OF THE SYMPOSIUM ON PROBLEMS OF INDIA ARID ZONES AND THE 20TH SESSION OF THE UNESCO ADVISORY COMMITTEE ON ARID LANDS, NOVEMBER-DECEMBER 1964.]

SAME AS AUTHOR. 148 P.

AGRICULTURE, ANIMAL HUSBANDRY, SHEEP AND WOOL, FOREST WEALTH, IRRIGATION, UNDERGROUND WATER EXPLOITATION, INDUSTRY, AND ARCHAEOLOGY COMPRISE THE DISCUSSION OF RESOURCES IN PERSPECTIVE.

RAJASTHAN/AGRICULTURE/LIVESTOCK/SHEEP(DOMESTIC)/FORESTS/IRRIGATION/ GROUNDWATER MINING/ECONOMIC DEVELOPMENT/ARCHAEOLOGY

13

CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR

1974

SEMINAR ON DESERT TECHNOLOGY.

SAME AS AUTHOR/INSTITUTION OF ENGINEERS [OF] INDIA, RAJASTHAN CENTRE, JAIPUR/ UNIVERSITY OF JODHPUR/MALVIYA REGIONAL ENGINEERING COLLEGE, JAIPUR.

COVERS WATER RESOURCES DEVELOPMENT FOR DESERTS, MINERAL RESOURCES, STABILIZATION OF SAND DUNES.

WATER RESOURCES DEVELOPMENT/MINERALS/SAND DUNES/CONSERVATION/EROSION CONTROL

14

CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR/INDIAN COUNCIL OF AGRICULTURAL RESEARCH

1968

SYMPOSIUM ON ARID ZONE.

INTERNATIONAL GEOGRAPHICAL CONGRESS, 21ST, JODHPUR, 1968, PROCEEDINGS.

ORGANIZED IN 5 SESSIONS COVERING 1) ARID AREAS OF INDIA, A REGIONAL INTRODUCTION TO THE FIELD STUDIES, 2) DESERT MARGINS, 3) NOMADISM AND ITS PRESENT DAY ASPECTS, 4) URBAN GEOGRAPHY IN ARID ENVIRONMENTS, AND 5) PROBLEMS OF INDIAN DESERTS.

ARID LANDS/NOMADS/URBAN AREAS/THAR DESERT

15

DESERT AFFORESTATION RESEARCH STATION, JODHPUR

1956

SOIL CONSERVATION IN THE RAJASTHAN DESERT; WORK OF THE DARS.

GOVERNMENT OF INDIA, MINISTRY OF FOOD AND AGRICULTURE. 22 P.

RAJASTHAN/AFFORESTATION/SOIL CONSERVATION

16

GANGULY, J.K./KAUL, R.N.

1969

WIND EROSION CONTROL.

INDIAN COUNCIL OF AGRICULTURAL RESEARCH, TECHNICAL BULLETIN 20. 57 P.
HA 40(3)2087.

DESCRIBES FACTORS CONTRIBUTING TO SOIL EROSION BY WIND, MEASURES FOR SOIL CONSERVATION, INCLUDING STUBBLE-MULCH FARMING, CROSS-WIND PLOUGHING AND WIND-STRIP CROPPING; WINDBREAKS AND SHELTERBELTS, INCLUDING A LIST OF RECOMMENDED TREE, SHRUB AND GRASS SPECIES FOR PLANTING IN DIFFERENT REGIONS OF INDIA; STABILIZATION OF SHIFTING SAND DUNES; SEED COLLECTION AND THE GROWING OF TREE NURSERIES FOR AFFORESTATION; NOTES ON SUITABLE TREE, SHRUB AND GRASS SPECIES; VERTEBRATE PESTS WHICH DAMAGE PLANTATIONS IN ARID REGIONS AND THEIR CONTROL.

WIND EROSION/SOIL EROSION/EROSION CONTROL/SOIL CONSERVATION/WINDBREAKS/TREES/SHRUBS/GRASSES/SAND DUNES/AFFORESTATION/PLANT COVER

17

GHOSE, B.

1965

THE GENESIS OF THE DESERT PLAINS IN THE CENTRAL LUNI BASIN OF WESTERN RAJASTHAN.

INDIAN SOCIETY OF SOIL SCIENCE, JOURNAL 13:123-126. SF (29)3200.

AERIAL PHOTOGRAPHS SHOW REMNANTS OF A FORMER WELL-INTEGRATED DRAINAGE SYSTEM, RESPONSIBLE FOR DEVELOPMENT OF EXTENSIVE ALLUVIAL PLAINS. THE CLIMATE DURING THE RECENT PAST WAS HUMID BUT AS IT BECAME ARID THE DRAINAGE SYSTEM WAS DISORGANIZED, OBLITERATED OR BURIED UNDER SAND. CERTAIN INLAND DEPRESSIONS RESEMBLING PLAYAS ARE THE DISCONNECTED SEGMENTS OF OLD STREAM BEDS.

RAJASTHAN/BASINS/DRAINAGE/PLAINS/AERIAL PHOTOGRAPHY/ALLUVIUM/CLIMATIC CHANGE/ ENVIRONMENTAL EFFECTS/DESERTIFICATION

18

GORBIE, R.M.

1948

COUNTERING DESICCATION IN THE PUNJAB.

GEOGRAPHICAL REVIEW 38:30-40.

PUNJAB/DESICCATION/LAND RECLAMATION

19

GOUDIE, A.S./ALLCHIN, A./HEDGE, K.T.M.

1973

THE FORMER EXTENSIONS OF THE GREAT INDIAN SAND DESERT.

GEOGRAPHICAL JOURNAL 139(2):243-257.

DESCRIBES THE RESULTS OF GEOMORPHOLOGICAL, ARCHAEOLOGICAL AND PALAEO-CLIMATIC STUDIES IN THE THAR DESERT REGION IN 1970-1972. ATTENTION WAS CONCENTRATED ON THE ZONE OF STABILIZED DUNES EAST OF THE PRESENT ACTIVE-DUNE LIMITS. THE EVIDENCE OF WEATHERING-PROFILES AND ASSOCIATED ARTEFACTS SUGGESTED AT LEAST TWO PHASES OF MARKED ARIDITY IN THE LATE PLEISTOCENE (WUERM), DURING WHICH SAND-BLOWING EXTENDED WELL BEYOND ITS PRESENT LIMITS. FROM FIELD EVIDENCE THE AUTHORS QUESTION BOTH THE WIDELY-HELD CONCEPT OF CONTEMPORANEITY OF GLACIAL MAXIMA AND LOW-LATITUDE PLUVIAL PHASES IN THE PLEISTOCENE, AND THE NOTION, ALSO WIDELY-HELD, THAT THE THAR DESERT HAS BEEN PRIMARILY MAN-MADE. HISTORICAL CLIMATES, ALTHOUGH OSCILLATORY, SHOW NO CONCLUSIVE EVIDENCE OF PROGRESSIVE DESICCATION.

THAR DESERT/GEOMORPHOLOGY/ARCHAEOLOGY/PALEOCLIMATOLOGY/DUNES/DESERTIFICATION/ PLEISTOCENE EPOCH/WEATHERING

20

GUPTA, R.K.

1968

ANTHROPOGENIC INFLUENCES ON THE VEGETATION OF WESTERN RAJASTHAN.

VEGETATIO 16(1-4):79-94. GA 69B-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

21

INDIA, MINISTRY OF IRRIGATION AND POWER

1971

DYNAMICS OF SHIFTING SAND DUNES IN WESTERN RAJASTHAN AND THEIR STABILISATION. REPORT.

CENTRAL WATER AND POWER COMMISSION.

DISCUSSES CLIMATOLOGY, DYNAMICS OF SAND DUNES AND THEIR STABILIZATION.

RAJASTHAN/SAND DUNES/CLIMATOLOGY/SAND CONTROL

22

INDIAN NATIONAL SCIENCE ACADEMY

1976

WINTER SCHOOL ON THE DEVELOPMENT OF RAJASTHAN DESERT, ORGANIZED IN COLLABORATION WITH THE CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR, FEBRUARY 12-18, 1973.

SAME AS AUTHOR. (IN PRESS)

COVERS SOILS, WATER, AFFORESTATION, PASTURE DEVELOPMENT, CROP AND ANIMAL HUSBANDRY, PLANT DISEASES AND RODENT AND PEST CONTROL, METEOROLOGY AND IMPROVEMENT OF WEATHER FORECASTS, SOLAR AND WIND POWER, MINERAL RESOURCES, AND SOCIOLOGICAL ASPECTS.

RAJASTHAN/SOIL TYPES/WATER RESOURCES/AFFORESTATION/AGRICULTURE/LIVESTOCK/ PASTURES/PLANT PATHOLOGY/RODENT CONTROL/PESTS/METEOROLOGY/WEATHER FORECASTNG/ SOLAR ENERGY/WIND POWER/MINERALS/SOCIAL ASPECTS

23

JODHA, N.S.

1968

COST-BENEFIT ANALYSIS OF PASTURE IMPROVEMENT IN THE ARID REGION OF RAJASTHAN.

ANNALS OF ARID ZONE 7(2):250-257. SWRA W70-01809.

NEARLY 315 OF THE STATE OF NORTHWESTERN RAJASTHAN (ABOUT 214,000 SQ KMS) IS ARID LAND. THE SANDY SOILS ARE SUSCEPTIBLE TO EROSION AND SUPPORT ONLY SPARSE VEGETATION. IN SPITE OF INCREASING COMPETITION FOR CROP LAND, AVALIABLE GRAZING LAND DECREASED WHILE LIVESTOCK POPULATION INCREASED OVER 50 PERCENT IN THE DECADE FROM 1951-1961. IN ORDER TO UTILIZE THE LIMITED SOIL MOISTURE TO MAINTAIN PRODUCTIVE GRAZING LAND, SCIENTIFICALLY AND ECONOMICALLY SOUND RANGE MANAGEMENT PRACTICES ARE ESSENTIAL. EXPERIMENTAL STUDIES HAVE DEVELOPED TWO METHODS THAT OFFER POSSIBILITY OF RAISING THE PRODUCTIVITY OF GRAZING LANDS: RANGE RESEEDING AND CONTOUR FURROWING (TO CONSERVE MOISTURE). COST-BENEFIT ANALYSIS OF BOTH METHODS IS PRESENTED USING AN INTEREST RATE OF 9 PERCENT. WITH AN ESTIMATED PROJECT LIFE OF 15 YEARS, RESEEDING HAD A COST-BENEFIT RATIO OF 1:3.47, WHILE CONTOUR FURROWING HAD A RATIO OF 1:5 ON A TEN YEAR BASIS. (OALS)

RAJASTHAN/RANGE MANAGEMENT/RANGE GRASSES/LAND RECLAMATION/REVEGETATION/ CONTOUR FURROWS/COST-BENEFIT ANALYSIS

24

JODHA, N.S.

1969

DROUGHT AND SCARCITY IN THE RAJASTHAN DESERT: SOME BASIC ISSUES.

ECONOMIC POLITICAL WEEKLY, BOMBAY 4(16):699-703.

ALTHOUGH SCARITY COULD BE MINIMIZED BY CONSERVATION MEASURES, SO FAR SUCH HAVE RECEIVED LOW PRIORITY IN GOVERNMENT DEVELOPMENT PROGRAMS.

RAJASTHAN/DROUGHTS/CONSERVATION/PLANNING/GOVERNMENT

25

JODHA, N.S.

1970

CONSERVATION TECHNOLOGY AND CAPITAL FORMATION IN ARID AGRICULTURE.

ANNALS OF ARID ZONE 9(4):215-220. SWRA W71-13580.

TWO PRINCIPAL PROBLEMS OF AGRICULTURE IN THE ARID ZONE OF NORTHWESTERN RAJASTHAN ARE LOW AND UNSTABLE CROP (AND LIVESTOCK) PRODUCTION AND RAPID NATURAL RESOURCE DEPLETION DUE TO UNSCIENTIFIC FARMING PRACTICES. THE PROBLEM OF PRODUCTION VARIABILITY IS DIRECTLY RELATED TO WATER SCARCITY. MANY WATER CONSERVATION METHODS MAY BE INTRODUCED INTO DRY-LAND AGRICULTURE SUCH AS SHELTERBELTS OR WINDBREAKS, BUNDING (AND OTHER EARTHWORKS) MICRO-WINDBREAKS, SAND DUNE STABILIZATION AND RANGE RESEEDING. CONSERVATION METHODS WILL NOT ONLY STABILIZE WATER SUPPLIES BUT ALSO COUNTERACT RESOURCE DEPLETION PROCESSES AND EVEN RAISE THE PRODUCTIVITY OF ARID LANDS.

RAJASTHAN/AGRICULTURE/WATER SHORTAGE/WATER CONSERVATION/ECONOMICS/ EROSION CONTROL/CONSERVATION

26

JOSHI, K.L.

1969

PROBLEMS OF DESERT AGRICULTURE IN PUNJAB HARYANA AND WEST RAJASTHAN.

SCIENCE AND CULTURE 35(10):550-555. MGA 21.110-463. 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

27

KAUSHIK, R.C./KAUL, R.N./SUBRAHMANYAM, V.P.

1969

HOMOCLIMES AND INTRODUCTION OF TREES AND SHRUBS WITH SPECIAL REFERENCE TO THE ARID AND SEMI-ARID ZONE OF INDIA.

INDIAN FORESTER 95(5):283-292. SWRA W71-00699.

SOME THEORIES ON THE NATURE OF CORRELATIONS BETWEEN VEGETATION ZONES AND CLIMATIC FACTORS ARE BRIEFLY REVIEWED AND TWO SYSTEMS OF CLIMATIC CLASSIFICATION ARE DISCUSSED IN SOME DETAIL. KOEPPEN'S SYSTEM RECOGNIZED THE INADEQUACY OF IDENTIFYING CLIMATIC REGIONS BY TEMPERATURE AND RAINFALL DATA, BUT FAILED TO EVALUATE ADEQUATELY THE HEAT FACTOR IN CLIMATE. THORNTHWAITE'S SYSTEM UTILIZED A CENTRAL PARAMETER-POTENTIAL EVAPOTRANSPIRATION WHICH, BECAUSE OF ITS DEPENDENCE ON ENERGY BALANCE, SERVES AS BOTH A MOISTURE AND A TEMPERATURE INDEX. IT IS RECOGNIZED THAT SEASONAL VARIATION OF EFFECTIVE MOISTURE HAS A PROFOUND INFLUENCE IN THE DEVELOPMENT OF CLIMATIC CLIMAXES IN THE EVOLUTION OF VEGETATION. IN DISCUSSING THE INTRODUCTION OF TREE AND SHRUB SPECIES INTO ARID AND SEMIARID ZONES, IT IS THEREFORE IMPORTANT TO MATCH CLIMATIC FACTORS FROM VARIOUS PARTS OF THE WORLD WHERE THE INTRODUCED SPECIES ARE NATIVE. ACCOMPANYING TABLES LIST VARIETIES OF TREE AND SHRUB SPECIES WHICH MIGHT PROFITABLY BE INTRODUCED INTO INDIAN ARID REGIONS AND CORRESPONDING WORLD HOMOCLIMES. (OALS)

CLIMATIC ZONES/CLIMATIC-VEGETAL RELATIONSHIPS/TREES/SHRUBS/THORNTHWAITE, C.W./ KOEPPENS CLIMATIC CLASSIFICATION/CLIMAX/CLIMATIC DATA/SEMIARID CLIMATE/ ARID CLIMATE/VEGETATION ESTABLISHMENT

28

KRISHMAN, M.S.

1952

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

NATIONAL INSTITUTE OF SCIENCES, INDIA, BULLETIN 1:19-31.

RAJASTHAN/DESERTIFICATION/CLIMATIC GEOMORPHOLOGY

29

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.

KWIC DE 23/DESERTIFICATION/OALS/AFFORESTATION/RAJASTHAN/INDIA/ PERTURBATION/CLIMATIC GEOMORPHOLOGY/CLIMATIC DATA/CLIMATIC CHANGE

30

KRISHNAN, A./BHATT, P.N./RAKHECHA, P.

1966

A SOIL MOISTURE REGIME AND MICROCLIMATOLOGICAL STUDY OVER SAND DUNES IN WESTERN RAJASTHAN.

ANNALS OF ARID ZONE 5(1):1-9. SWRA W69-00365.

IN ORDER TO STUDY THE MICROCLIMATE AND SOIL MOISTURE REGIME OF THE DUNES OF RAJASTHAN, STABILIZED AND UNSTABILIZED DUNES AT OSIAN WERE SELECTED. DIURNAL CYCLE, MICROCLIMATE AND SOIL MOISTURE OBSERVATIONS WERE TAKEN ON TWO DAYS DURING THE FOUR SEASONS: WINTER, HOT WEATHER PERIOD, MONSOON AND POST MONSOON. HIGH MOISTURE CONCENTRATION OCCURRED BELOW 4 METER DEPTH IN THE STABILIZED SAND DUNE DURING MARCH TO JULY AND BELOW 1.5 METER DEPTH IN THE UNSTABLIZED SAND DUNE THROUGHOUT THE YEAR. VERTICAL MOISTURE MOVEMENT UNDER THE INFLUENCE OF TEMPERATURE GRADIENTS APPEARED TO BE THE FACTOR CAUSING THIS OCCURRENCE. (OALS)

RAJASTHAN/SOIL MOISTURE/MICROCLIMATOLOGY/DUNES/SOIL TEMPERATURE/TEMPERATURE/ CLIMATIC DATA

31

KRISHNAN, A./THANVI, K.P.

1969

WATER BUDGET IN THE ARID ZONE OF RAJASTHAN DURING 1941-1960.

ANNALS OF ARID ZONE 8(2):291-299. SWRA W71-00153.

RECORDS OF 7 WEATHER STATIONS IN ARID WEST RAJASTHAN FROM 1941-1960 WERE ANALYZED IN AN ATTEMPT TO ELUCIDATE YEAR TO YEAR VARIABILITY IN THE VARIOUS COMPONENTS OF WATER BALANCE. NORMALLY, ALL STATIONS SHOW A WATER DEFICIT EVERY MONTH OF THE YEAR, WHICH DECREASES CONSIDERABLY DURING THE MONSOON SEASON OF JULY TO OCTOBER. DURING MOST YEARS THERE IS NEITHER WIDESPREAD DROUGHT NOR EXCESS PRECIPITATION AND EVEN IN THE WETTEST YEAR MOISTURE DEFICIENCY FROM JANUARY TO MONSOON ONSET WAS HIGH. GENERALLY, MOISTURE SURPLUS IN EXCESS OF SOIL WATER CAPACITY, EFFECTING GROUNDWATER RECHARGE, OCCURS ONLY ONCE IN 20 YEARS. (OALS)

RAJASTHAN/WATER BALANCE/WEATHER DATA/RAINFALL STATIONS/PRECIPITATION DEFICIT/ GROUNDWATER RECHARGE/SOIL MOISTURE/VARIABILITY (ENVIRONMENTAL)

32

MANN, H.S.

1972

SCIENCE AND DESERT CONTROL.

INDIAN FARMING 22(6):5-8.

DESERT ENCROACHMENT IS A PROBLEM IN THE RAJASTHAN, HARYANA, BECAUSE SOCIAL AND TECHNOLOGICAL ADVANCEMENTS HAVE YET TO BE INTRODUCED AND IMPLEMENTED. AGRICULTURAL PRODUCTION IN DESERT AREAS IS LOWER THAN OTHER AREAS CAUSING A DISCREPENCY AND IMBALANCE ON THE STANDARD OF LIVING. DESERTIFICATION IS FURTHER CAUSED BY SCARCITY OF WATER, VEGETATION, FOOD, FODDER AND FUEL LEADING TO OVER-EXPLOITATION OF NATURAL RESOURCES, AND SUBSEQUENTLY EROSION, DUE TO A LOSS OF SOIL AND ITS FERTILITY. THE AUTHOR BELIEVES THAT NOMADISM IS A RESULT OF THIS MISUSE. RESEARCH CONDUCTED BY THE CENTRAL ARID ZONE RESEARCH INSTITUTE AT JODHPUR IS HELPING SOLVE SOME OF THESE PROBLEMS.

KWIC DE 18/OALS/DESERTIFICATION/INDIA/RAJASTHAN/SOCIAL ASPECTS/ AGRICULTURE/ECONOMICS/WATER SHORTAGE/NATURAL RESOURCES/LAND MANAGEMENT/NOMALS

33

MANN, H.S./LAHIRI, A.N./PAREEK, O.P.

1976

A STUDY ON THE MOISTURE AVAILABILITY AND OTHER CONDITIONS OF UNSTABILIZED DUNES IN THE CONTEXT OF PRESENT LAND USE AND THE FUTURE PROSPECTS OF DIVERSIFICATION.

ANNALS OF ARID ZONE. (IN PRESS)

PROSPECTS OF PLANT PRODUCTION ON DESERT DUNES HAVE BEEN CONSIDERED WITH SPECIAL REFERENCE TO PREVAILING SOIL-WATER CONDITIONS.

DUNES/LAND USE/SOIL-WATER-PLANT RELATIONSHIPS/VEGETATION ESTABLISHMENT

34

MANN, H.S./MALHOTRA, S.P./KALLA, J.C.

1973

DESERT SPREAD: A QUANTITATIVE ANALYSIS IN THE ARID ZONE OF RAJASTHAN.

ANNALS OF ARID ZONE 13(2):103-113.

COMPARISON OF PARAMETERS OF LAND USE, WATER AVAILABILITY, AND CROP YIELD BETWEEN DESERT AREAS AND NON-DESERT BORDERING DISTRICTS FOR MORE THAN THIRTEEN YEARS REVEALS NO SIGNIFICANT EVIDENCE TO SUPPORT THE BELIEF THAT THE DESERT IS SPREADING TO THE EAST. IMPORTANCE OF PROPER RESOURCE USE TECHNIQUES IN DESERT REGIONS IS STRESSED. (OALS)

OALS/KWIC DE 29/INDIA/RAJASTHAN/DESERTIFICATION/CLIMATIC CHANGE/VEGETATION CHANGE/LAND USE/CROP PRODUCTION/MOISTURE AVAILABILITY

35

MANN, H.S. ED.

1976

DESERT ECOSYSTEM AND ITS IMPROVEMENT.

CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR. (IN PRESS)

SUBJECTS RANGE FROM THE EVOLUTION OF THE DESERT TO RODENT PEST CONTROL.

ECOSYSTEMS/DESERT BIOME/RECLAMATION

36

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

37

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

38

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.

KWIC MF 7336/RAJASTHAN/THAR DESERT/INDIA/PHYSICAL GEOGRAPHY/ OROGRAPHY/CLIMATOLOGY/ATMOSPHERIC CIRCULATION/DEGENERATION/DESERTS/ OALS

39

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

40

NATIONAL INSTITUTE OF SCIENCES, INDIA

1969

SYMPOSIUM ON PLANNING FOR DROUGHT AREAS.

SAME AS AUTHOR.

COVERS ECONOMIC AND GENERAL ASPECTS OF PLANNING FOR DROUGHT AREAS: CLIMATE, ECOLOGY, AND HYDROLOGY; MOISTURE CONSERVATION, SOIL MANAGEMENT, NUTRITION AND TILLAGE; PHYSIOLOGICAL AND BIOCHEMICAL APPROACHES TO DROUGHT CONTROL; NEW PLANT VARIETIES FOR DROUGHT RESISTANCE; PLANT PROTECTION; LIVESTOCK MANAGEMENT.

DROUGHTS/CLIMATE/ECOLOGY/HYDROLOGY/PLANNING/SOIL MANAGEMENT/DROUGHT TOLERANCE/ LIVESTOCK/PLANTS/WATER CONSERVATION

41

OLDHAM, R.D.

1886

ON PROBABLE CHANGES IN THE GEOGRAPHY OF THE PUNJAB AND ITS RIVERS; A HISTORICO-GEOGRAPHICAL STUDY.

ASIATIC SOCIETY, BENGAL, JOURNAL 55:322-343.

PUNJAB/RIVERS/REGIONAL GEOGRAPHY/HISTORY/PHYSICAL GEOGRAPHY/GEOMORPHOLOGY

42

PALIWAL, K.V.

1971

QUALITY OF IRRIGATION WATERS AND THEIR EFFECT ON SOIL PROPERTIES IN RAJASTHAN--A REVIEW.

ANNALS OF THE ARID ZONE 10(4):267-278. SWRA W73-01765.

UNDER ARID AND SEMI-ARID CONDITIONS, IRRIGATION IS ESSENTIAL FOR SUCCESSFUL AGRICULTURE. HOWEVER, LARGE AREAS ARE GOING OUT OF CULTIVATION EACH YEAR DUE TO IRRIGATION WITH SALINE WATER. IN RAJASTHAN, INDIA, RESOURCES FOR IRRIGATION WATER ARE VERY MEAGER WHERE ONLY 6 PERCENT OF THE TOTAL AREA OF 34,222 HECTARES IS UNDER IRRIGATION. FIFTY-EIGHT PERCENT OF THIS SMALL AMOUNT IS COVERED BY WELL WATERS; THE BALANCE BY TANKS AND CANALS. QUALITY OF IRRIGATION WATER RESOURCES OF RAJASTHAN AND THEIR EFFECT ON SOIL PROPERTIES ARE REVIEWED. CONCLUSIONS INDICATE THAT CANAL WATERS ARE QUITE SUITABLE FOR IRRIGATION PURPOSES. WELL WATERS OF WESTERN RAJASTHAN ARE MORE SALINE AND HAZARDOUS THAN THOSE IN THE EAST. SALINE WATER-IRRIGATED SOILS HAVE MODERATE TO HIGH LEVELS OF SALINITY AND ALKALINITY DEPENDING ON THE QUALITY OF WELL WATER USED. AS REFLECTED IN THE STATISTICAL ANALYSIS, LACK OF EQUILIBRIUM BETWEEN THE IRRIGATION WATER AND THE SOIL SOLUTION IS RESPONSIBLE FOR THE LOW DEGREES OF PREDICTABILTY. BETTER RELATIONSHIPS ARE OBSERVED THROUGH SYSTEMATIC STUDY OF EQUILIBRIUM CONDITIONS IN THE LABORATORY. (OALS)

RAJASTHAN/IRRIGATION WATER/IRRIGATION EFFECTS/SALINITY/WATER QUALITY/WELLS/ SALINE WATER/SALINE SOILS/SOIL-WATER-PLANT RELATIONSHIPS/ANALYTICAL TECHNIQUES/ CANALS

43

PANDEY, S./CHATTERJI, P.C.

1970

GENESIS OF 'MITHA RANNS', 'KHARIA RANN', AND 'KANODWALA RANNS' IN THE GREAT INDIAN DESERT.

ANNALS OF ARID ZONE 9(3):175-180. SWRA W71-12140.

SALINE DEPRESSIONS IN THE INDIAN DESERT GATHER GROUNDWATER AND CONCENTRATE NATURAL EVAPORITES. THEY ARE FOUND IN THE EXTREMELY ARID ZONE OF RAJASTHAN, WHERE THE RAINFALL IS SPARSE AND ERRATIC. THESE DEPRESSIONS, OR RANNS, ARE UNDERLAIN BY JURASSIC AND CRETACEOUS SANDSTONES AND LIMESTONES, AS WELL AS BY QUATERNARY CLAYS AND RECENT BLOWN SANDS. THE RANNS ARE INDIVIDUAL BASINS SEPARATED BY UPLANDS, BUT FEW STREAMS DRAIN INTO THEM. THE RANNS APPEAR TO FOLLOW FAULT ZONES CLOSELY, AS A MAP ILLUSTRATES. (OALS)

RAJASTHAN/GEOLOGY/DEPRESSIONS(GEOMORPHIC)/SURFACE-GROUNDWATER RELATIONSHIPS/ GEOMORPHOLOGY/PLAYAS/GROUNDWATER/EVAPORATION

44

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

45

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

46

PRAMANIK, N./GHOSE, S.K.

1952

METEOROLOGICAL CONDITIONS AND THE EXTENSION OF THE RAJASTHAN DESERT.

INDIAN JOURNAL OF METEOROLOGY AND GEOPHYSICS 3(2):313-341.

RAJASTHAN/DESERTIFICATION/METEOROLOGY

47

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

1953

ANALYSIS OF THE CLIMATE OF THE RAJASTHAN DESERT AND ITS EXTENSION. IN DESERT RESEARCH, INTERNATIONAL SYSPOSIUM HELD MAY 7-14, 1952, JERUSALEM, PROCEEDINGS, P. 176-184.

RESEARCH COUNCIL OF ISRAEL, SPECIAL PUBLICATION 2.

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

48

RAJASTHAN SPECIAL SCHEME ORGANIZATION, JAIPUR

1975

DROUGHT PRONE PROJECT. 3 VOLS.

SAME AS AUTHOR.

STRATEGY AND PROJECT COST, RESOURCES OF THE DISTRICT, CORE PROGRAMS.

RAJASTHAN/DROUGHTS/COSTS/PLANNING

49

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 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.

PAKISTAN/WATER SUPPLY/OALS/INDUS BASIN/MONSOONS/RAJASTHAN/CLIMATIC CHANGE/DESERTIFICATION/HISTORY/RADIOCARBON DATING/ARCHAEOLOGY/ VEGETATION CHANGE

50

RAO, Y.P./DESAI, B.N.

1970

INDIAN SUMMER MONSOON.

SYMPOSIUM ON TROPICAL METEOROLOGY, HONOLULU, 1970, PROCEEDINGS, SECTION J-V. 6 P. MGA 22.10-306.

THIS DISCUSSION OF THE INDIAN MONSOON CIRCULATION AND OF THE COURSES OF THE MONSOON RAINFALL OCCURRENCE, AMOUNT, AND DISTRIBUTION COMPRISES THE FOLLOWING: CLIMATOLOGY OF THE SUMMER MONSOON SEASON INCLUDING TEMPERATURE DISTRIBUTION, AIR MASSES OVER THE INDIAN AREA, MECHANISM OF DEVELOPMENT OF LOWEST PRESSURE OVER EAST PAKISTAN, AND OF THE TROUGH OVER THE GANGETIC VALLEY; THE COURSE OF MONSOON DEVELOPMENT; THE MONSOON RAINS; THE MONSOON DEPRESSION; THE THAR DESERT; ORIGIN OF THE SOUTHWESTERLY TO WESTERLY MOIST CURRENT OVER THE ARABIAN SEA; AND THE MONSOON CIRCULATION CELL.

MONSOONS/ATMOSPHERIC CIRCULATION/CLIMATOLOGY/AIR TEMPERATURE/THAR DESERT/ ATMOSPHERIC PRESSURE/RAINFALL/METEOROLOGY/SUMMER PRECIPITATION

51

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

52

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/HYDROLOGY/ PLANTS/ANIMALS/CULTURAL GEOGRAPHY/MIOCENE EPOCH/PALEOCLIMATOLOGY/ PALEOGEOGRAPHY/CLIMATIC GEOMORPHOLOGY

53

SATYANARAYAN, Y./DHRUVANARAYAN, V.V.

1968

USE OF AERIAL PHOTOGRAPHS IN SURVEYING GROUNDWATER AND VEGETATION RESOURCES IN THE ARID ZONE OF INDIA. IN AERIAL SURVEYS AND INTEGRATED STUDIES, PROCEEDINGS OF THE TOULOUSE CONFERENCE, P. 505-507.

UNESCO, PARIS. GA 70B-155. SWRA W68-00092.

WORK ON AN ARID ' THE SOUTHEAST MARGIN OF THE THAR DESERT (JALOR COMMUNITY DEVELO LOCK) IS DESCRIBED. MOST OF THE WORK WAS ON WATER SUPPLY AND VEGE' IT WAS POSSIBLE TO ESTIMATE RUN-OFF YIELD AND THE QUALITY AND QUA ' AVAILABLE GROUNDWATER. ONLY BROAD VEGETATION TYPES CAN BE DISTINGUI IE TO THE SPARSE COVER AND THE HIGH INTENSITY OF DISTURBANCE.

THAR DESERT/GROUNDWATER/AERIAL PHOTOGRAPHY/VEGETATION/RUNOFF/WATER YIELD

54

SATYANARAYAN, Y./GAUR, Y.D.

1967

PHYTOSOCIOLOGICAL VARIATIONS IN FLORISTIC COMPOSITION OF THE VEGETATION IN THE ARID ZONE. I: MONSOONAL VEGETATION OF THE ALLUVIAL PLAINS.

ANNALS OF ARID ZONE 6(2):178-199. SWRA W70-02553.

IN ARID ZONES ONE OF THE MOST IMPORTANT VEGETATION FORMS ARE THE THEROPHYTES, ANNUALS WHICH SPRING UP FOLLOWING A RAINY PERIOD, MOVE SWIFTLY THROUGH THEIR LIFE CYCLE AND SURVIVE THROUGH THE DORMANT SEASON ONLY IN SEED FORM. THEY USUALLY FORM SOME OF THE MOST PALATABLE FORAGE AND ARE LIKELY TO BE GRAZED OFF BEFORE MATURE SEEDS DEVELOP IF THE ARID RANGE IS OVERGRAZED. THIS PAPER REPORTS A STUDY OF FLORISTIC CHANGES THAT OCCUR IN RANGE LANDS ON THE ALLUVIAL PLAINS NEAR JODHPUR, INDIA. THE CLIMATE OF THE AREA IS CHARACTERIZED BY LOW RAINFALL, HIGH TEMPERATURES, LOW HUMIDITY AND DESICCATING WINDS. THE MONSOONS OCCUR DURING THE SUMMER AND THE GROWING SEASON OF ABOUT 90 DAYS FOLLOWS ONSET OF THE RAINS. ONLY FIVE PERENNIALS WERE FOUND IN THE LONG DRY PERIOD BEFORE THE MONSOONS. DURING MONSOONS PERENNIALS INCREASE IN NUMBER OF COLONIES BUT DECREASE IN NUMBER OF INDIVIDUALS. FORBS INCREASE RAPIDLY IN NUMBER BUT PERENNIAL WEEDS ARE SLOW TO GERMINATE. DESIRABLE EPHEMERALS DO NOT COMPLETE SUCCESSFULLY WITH WEED SPECIES WHICH COMPETE MORE SUCCESSFULLY WITH PERENNIALS. FIVE SPECIES WERE FOUND THAT COULD BEHAVE AS ANNUALS OR AS PERENNIALS DEPENDING UPON ENVIRONMENTAL CONDITIONS. (OALS)

VEGETATION/THEROPHYTES/ARID CLIMATE/PLAINS/MONSOONS/FORAGE PLANTS/RANGES/ CLIMATIC-VEGETAL RELATIONSHIPS/PERENNIALS/EPHEMERALS/ANNUALS/FORBS/ DESERT PLANTS/PLANT POPULATIONS

55

SINGH, R.P. ET AL

1974

HUNGRY DRYLANDS OF WESTERN RAJASTHAN NEED A NEW TECHNOLOGY. CENTRAL ARID ZONE RESEARCH INSTITUTE, JODHPUR, DRY FARMING RESEARCH MAIN CENTRE.

INDIAN FARMING 23(12):5-6. SWRA W75-09789.

AN ACUTE ECOLOGICAL IMBALANCE OF THE COMPONENTS OF PRODUCTIVITY IS RESPONSIBLE FOR LIMITING CROP PRODUCTION IN THE DRYLANDS OF WESTERN RAJASTHAN. IN ADDITION TO LOW AND ERRATIC ANNUAL PRECIPITATION, PROBLEMS INCLUDE A HIGH SOLAR INCIDENCE, HIGH WIND VELOCITY RESULTING IN A HIGH POTENTIAL EVAPOTRANSPIRATION, AND SANDY SOILS THAT ARE LOW IN ORGANIC MATTER WITH POOR MOISTURE-HOLDING CAPACITIES AND HIGH INFILTRATION RATES. SOILS ARE OFTEN HIGH IN SALINITY AND ALKALINITY; SOIL CRUST FORMATION AFTER SOWING COMPLICATES THE SITUATION. A NEED EXISTS FOR APPROPRIATE CROP PLANNING COUPLED WITH A FLEXIBLE TECHNOLOGY OF MOISTURE CONSERVATION AND FERTILIZER USE. SOME PRACTICES THAT WOULD IMPROVE CROP PRODUCTION ARE: WATER HARVESTING TO MAKE FULL USE OF THE LIMITED PRECIPITATION, MULCHES TO MINIMIZE EVAPORATION LOSSES, BETTER CHOICES OF CROPS AND VARIETIES WITH CHARACTERISTICS SUCH AS DROUGHT TOLERANCE AND A SUITABLE MATURITY PATTERN, FERTILIZERS TO INCREASE YIELDS AND CROP EFFICIENCIES, AND THE USE OF SOIL AMENDMENTS FOR MORE EFFICIENT UTILIZATION OF THE LIMITED SOIL MOISTURE. (OALS)

RAJASTHAN/CROP PRODUCTION/ARID LANDS/PLANNING/WATER CONSERVATION/SALINITY/ SOIL AMENDMENTS/AGRICULTURAL CLIMATOLOGY/FERTILIZERS/PLANTING MANAGEMENT

56

SUBRAHMANYAM, V.P./SASTRI, C.V.S.

1969

SOME ASPECTS OF DROUGHT CLIMATOLOGY OF THE DRY SUBHUMID ZONES OF SOUTH INDIA.

METEOROLOGICAL SOCIETY OF JAPAN 47(4):239-244. SWRA W71-04298.

IN ATTEMPTING TO EVALUATE DROUGHT, RAINFALL ANALYSIS IS INSUFFICIENT, WATER BUDGETS ALONE ARE CAPABLE OF YIELDING OBJECTIVE DATA. USING THORNTHWAITE'S METHODS, THE DRY REGIONS OF SOUTH INDIA WERE DEMARCATED INTO 3 CLIMATIC TYPES-DRY SUBHUMID, SEMIARID AND ARID. DEFICIENCIES OF 50 PERCENT IN RAINFALL IN HUMID OR ARID CLIMATES DO NOT GREATLY AFFECT WATER BALANCE. BY CONTRAST, DROUGHT STUDY IN DRY SUBHUMID ZONES IS ESPECIALLY INTERESTING BECAUSE WATER BALANCES FLUCTUATE SO FREQUENTLY AND VIOLENTLY. THE ARIDITY INDEX IS THE RATIO OF ANNUAL WATER DEFICIENCY TO TOTAL ANNUAL WATER NEED. DROUGHT INTENSITY IS EVALUATED BY THE DEPARTURE OF ARIDITY INDICES FROM THEIR MEDIAN. DROUGHT INDICES WERE PLOTTED FROM 4 REPRESENTATIVE WEATHER STATIONS FOR THE PERIOD 1891-1965. PLOTS OF ARIDITY INDEX VS. TIME SHOWED LONG-TERM TRENDS IN CLIMATIC SHIFTS TOWARD ARID OR HUMID. PLOTS OF ACTUAL EVAPOTRANSPIRATION, POTENTIAL EVAPORATION AND RAINFALL VS. MONTH GIVE ACCURATE PICTURE OF WATER BALANCE FLUCTUATIONS OVER A GIVEN YEAR. THIS DATA IS PARTICULARLY CRUCIAL FOR AGRICULTURE IN SUBHUMID ZONES. (OALS)

DROUGHTS/CLIMATOLOGY/WATER BALANCE/THORNTHWAITE, C.W./CLIMATIC ZONES/ ARIDITY INDEX/EVAPOTRANSPIRATION/HISTORY/AGRICULTURAL CLIMATOLOGY/ VARIABILITY(ENVIRONMENTAL)

57

SUBRAHMANYAM, V.P./SASTRI, C.V.S.

1971

NEW TECHNIQUES IN DROUGHT ANALYSIS.

ANNALS OF ARID ZONE 10(2-3):120-135. SWRA W73-00899.

THOUGH DROUGHTS HAVE LONG BEEN RECOGNIZED AS ONE OF THE SEVEREST CATASTROPHES OF NATURE AGAINST MAN, NO SYSTEMATIC METHODS FOR THEIR COMPLETE UNDERSTANDING OR FOR THEIR PREDICTION HAVE YET BEEN DEVELOPED. HOWEVER, DROUGHTS, UNLIKE FLOODS, DO NOT DESCEND SUDDENLY WITHOUT WARNING; THEY REQUIRE EXTENDED PERIODS OF TIME TO DEVELOP. HENCE, SYNOPTIC AND DYNAMIC APPROACHES TO THIS PROBLEM ARE BELIEVED TO YIELD OBJECTIVE RESULTS AND RENDER DROUGHT PREDICTION POSSIBLE. FOLLOWING CUMULATIVE DEVIATION TECHNIQUES AND MAKING USE OF MONTHLY DEFICIENCY VALUES OBTAINABLE FROM WATER BUDGETING PROCEDURES, ATTEMPTS ARE MADE TO OBTAIN SEVERITY INDICES FOR DROUGHT SPELLS OF DIFFERENT DURATIONS. CUMULATIVE DEVIATION DIAGRAMS THUS PREPARED FOR TWO STATIONS IN ANDHRA PRADESH ARE PRESENTED AND DISCUSSED. USING SEVERITY INDICES OBTAINED FROM THE ABOVE METHOD, THIS TECHNIQUE PROVIDED OBJECTIVE CATEGORIZATION OF DROUGHTS WHEN APPLIED TO DURATION AND SEVERITY DATA FROM A NUMBER OF WEATHER STATIONS IN DIFFERENT CLIMATIC ZONES OF SOUTH INDIA. (OALS)

DROUGHTS/CLIMATOLOGY/ANALYTICAL TECHNIQUES/SYNOPTIC ANALYSIS/CLIMATIC DATA/ FORECASTING/CLIMATIC DATA

58

SUBRAHMANYAM, V.P./SUBRAMANIAM, A.R.

1965

SOME CHARACTERISTICS AND FREQUENCIES OF OCCURRENCE OF DROUGHTS IN THE DRY CLIMATIC ZONES OF INDIA.

INTERNATIONAL ASSOCIATION OF SCIENTIFIC HYDROLOGY, BULLETIN 10(3):31-37. SWRA W69-06524.

DESCRIBED HERE WERE RESULTS OF A CLIMATIC STUDY OF CHARACTERISTICS AND DECENNIAL FREQUENCIES OF DROUGHTS IN THREE DRY CLIMATIC ZONES OF INDIA. THE ZONES WERE ARID, SEMIARID AND DRY SUBHUMID. CLIMATES WERE CLASSIFIED ACCORDING TO THE WATER BALANCE SCHEME OF THORNTHWAITE. THE ARIDITY INDEX WAS COMPUTED FOR EACH YEAR OF A 65-YEAR PERIOD OF RECORD FOR ALL SELECTED STATIONS. FROM YEARLY TRENDS OF THE INDEX, IT COULD BE ASCERTAINED WHETHER A STATION WAS BECOMING DRIER, LESS DRY OR REMAINING STEADY. THE STANDARD DEVIATION WAS ADOPTED FOR CLASSIFICATION OF DROUGHTS INTO FOUR DIFFERENT DEGREES OF SEVERITY: MODERATE, LARGE, SEVERE AND DISASTEROUS. DURING THE EARLY PART OF THIS CENTURY NORTH INDIA EXPERIENCED SERIOUS DROUGHTS WHILE IN SOUTH INDIA MENTIONABLE DROUGHTS OCCURRED IN THE LATTER DECADES. ONE ASPECT OF DROUGHT CLIMATOLOGY WAS OCCURRENCE OF CLIMATIC SHIFTS RESULTING FROM WIDE YEAR-TO-YEAR FLUCTUATIONS IN WATER BALANCE. UNDER SUCH CIRCUMSTANCES, IT WAS NOT UNCOMMON FOR THE NORMAL CLIMATIC REGIME TO BE THROWN INTO ONE OR MORE ARID OR MORE HUMID CATEGORY. (OALS)

DROUGHTS/CLIMATIC ZONES/WATER BALANCE/THORNTHWAITE, C.W./ARIDITY INDEX/ VARIABILITY(ENVIRONMENTAL)/CLIMATOLOGY

59

TEWARI, A.K.

1968

AGRICULTURAL LAND USE IN THE ARID TRACT OF RAJASTHAN.

INTERNATIONAL GEOGRAPHICAL CONGRESS, 21ST, DELHI, 1968, PROCEEDINGS, P. 24-31.

AGRICULTURAL LAND USE IN THE ARID WESTERN RAJASTHAN HAS CHANGED LITTLE SINCE PALEOLITHIC HUMAN CULTURE. THE HOSTILE CLIMATE, THE NATURE OF THE TOPOGRAPHY, AND THE SOCIO-ECONOMIC STATUS OF THE SETTLERS HAVE RENDERED THE LAND FIT ONLY FOR PASTORAL NOMADISM OR FOR THE CULTIVATION OF ONLY COARSE MILLETS AND OIL SEED. SURVEYS IN THE SANDY AND ROCKY DESERTS AND IN THE ARID AND SEMIARID FRINGES SHOW THAT THE NATURE OF LAND USE VARIES DIRECTLY WITH THE CHARACTER OF THOSE UNITS.

RAJASTHAN/AGRICULTURE/LAND USE/TOPOGRAPHIC FEATURES/NOMADS/AGRICULTURAL CLIMATOLOGY

60

VERSTAPPEN, H.T.

1968

GEOMORPHOLOGY AT THE CENTRAL ARID ZONE RESEARCH INSTITUTE, INDIA.

NATURE AND RESOURCES 4(3):6-9. SWRA W71-03339.

THE CENTRAL ARID ZONE RESEARCH INSTITUTE (CAZRI) CURRENTLY HAS 5 DIVISIONS WITH 2 MORE PLANNED. IN ONE OF THE LARGEST, THE BASIC RESOURCES STUDIES DIVISION, BLOCK STUDIES ARE CENTRAL TO DATA ACCUMULATION AND MAP CONSTRUCTION ARE FOLLOWED BY FULL INTEGRATION BETWEEN THE STUDIES AND THEIR IMMEDIATE USE. GEOMORPHOLOGY HAS BEEN RECOGNIZED AS A KEY FACTOR AND STEREOSCOPIC STUDIES OF AERIAL PHOTOGRAPHS HAVE BEEN EXTENSIVELY UNDERTAKEN. SOME IMPORTANT GEOMORPHOLOGICAL RESEARCH PROJECTS CURRENTLY IN PROGRESS ARE : 1) ORIENTATION AND GEOMORPHOLOGY OF DUNES/SAND GRAINS INVOLVING MOISTURE RETENTION AND GRAIN CEMENTATION, 2) QUANTITIVE GEOMORPHOLOGY OF DRAINAGE BASINS, LINKING GEOMORPHOLOGY TO HYDROLOGY AND OBTAINING ESTIMATES OF RIVER LOAD AND RUNOFF, 3) RIVER MEANDERING BEHAVIOR LEADING TO PRACTICAL CONSIDERATIONS FOR BRIDGE BUILDING, 4) FORMER DRAINAGE CHANNELS WHICH GIVE INSIGHTS INTO CURRENT SALINITY AND SUBSURFACE WATER DISTRIBUTIONS AND 5) GRANITE WEATHERING AND ITS RESULTING EFFECTS ON SURFACE WATER INFILTRATION. MUCH OF THE WORK IS EXTENSIVELY INTERDISCIPLINARY. RECOMMENDATIONS ARE MADE FOR FUTURE STUDIES. (OALS)

GEOMORPHOLOGY/AERIAL PHOTOGRAPHY/DUNES/BASINS/DRAINAGE/RIVERS/ HYDROLOGIC DATA/WEATHERING/ENVIRONMENTAL EFFECTS/INSTITUTIONS

61

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/DUNES/ DESERTIFICATION/ARIDITY

62

WADIA, D.N.

1960

THE POST-GLACIAL DESICCATION OF CENTRAL ASIA: EVOLUTION OF THE ARID ZONE OF ASIA.

NATIONAL INSTITUTE OF SCIENCES OF INDIA, NEW DELHI. 25 P.

THE AUTHOR CONCLUDES THAT SUB-RECENT DESICCATION OF CENTRAL ASIA FROM ARABIA TO THE GOBI IS IN CONTINUATION OF AND CONTEMPORANEOUS WITH THE SAHARA. THE CAUSE IS TO BE SOUGHT IN THE REACTION THAT SET IN AT THE END OF THE ICE AGE AFFECTING THE SURFACE OF THE FORMER PLUVIAL ZONE. FEW DETAILS OR STATISTICS OF DATES, EVENTS, AND WEATHER OBSERVATIONS ARE AVAILABLE, WITH THE MAIN SOURCE OF KNOWLEDGE ON THE SUBJECT TAKEN FROM MEDIEVAL BOOKS ON HISTORY, AND TRAVELS BY GEOGRAPHERS AND EXPLORERS OF THE LAST TWO CENTURIES. DATA ON TEMPERATURE, HUMIDITY, RAINFALL AND EVAPORATION FROM STATIONS IN THE INDIAN DESERT REGION IS PRESENTED TO ILLUSTRATE THE CLIMATE AND HYDROLOGY OF ARID ZONE IN GENERAL. (OALS)

OALS/DESICCATION/DESERTIFICATION/CENTRAL ASIA/MIDDLE ASIA/GOBI/ PALEOCLIMATOLOGY/GLACIAL DRIFT/GEOLOGY/HISTORY/SAHARA/DESERTS/RIVERS/ LAKES/LAND RECLAMATION/INDIA/THAR DESERT/KWIC DE 2

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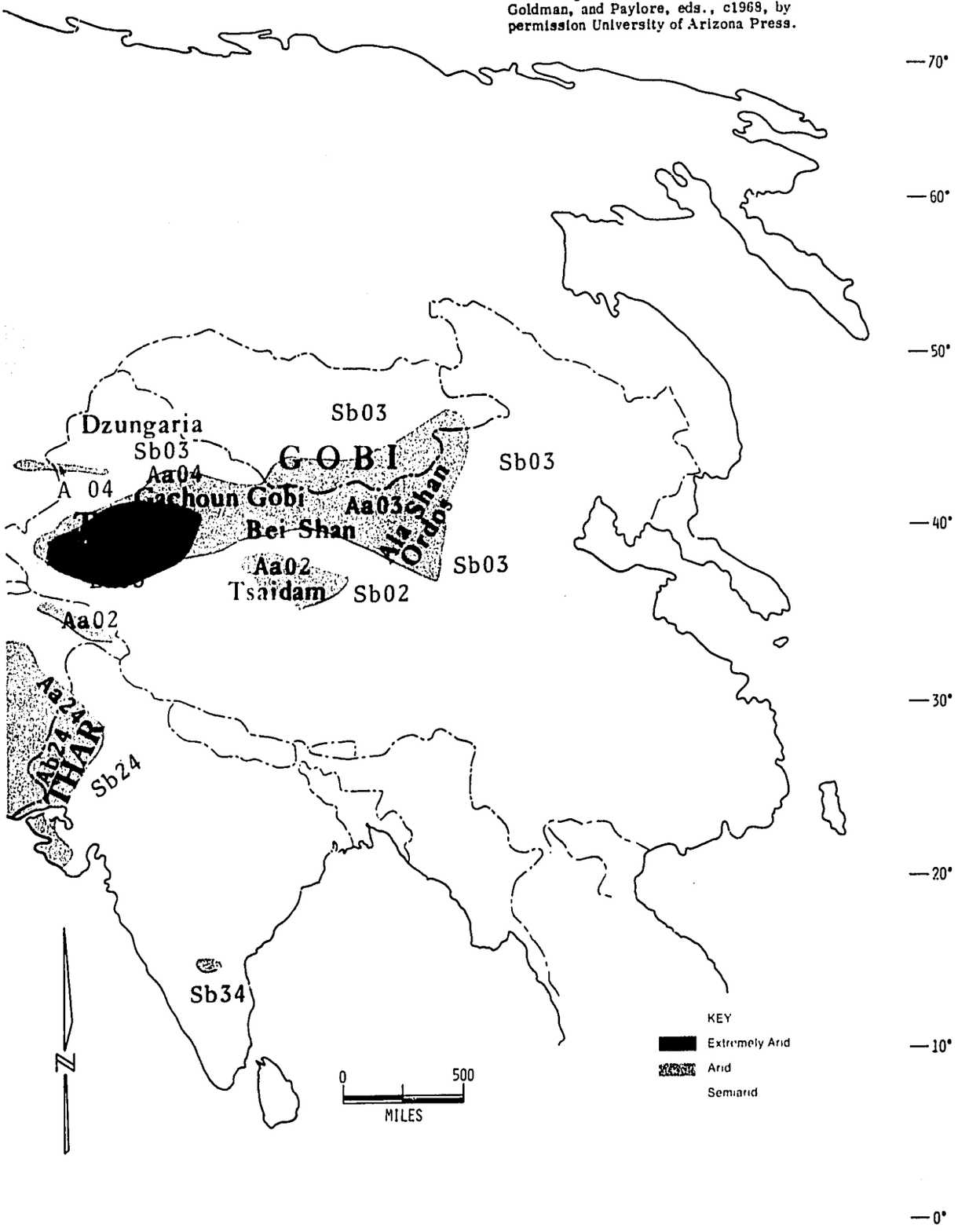
# CHINA

Reprinted from DESERTS OF THE WORLD: An Appraisal of Research into Their Physical and Biological Environments. McGinnies, Goldman, and Paylore, eds., c1968, by permission University of Arizona Press.




Arid Lands of Asia: Eastern Portion (after Meigs)

## CHINA : An Editorial Note

In the absence of a regional collaborator from China we have retrieved these few references from our own Aric Lands Information System (ALIS), and offer them without further explanation. There are no recent entries, though we scanned several abstracting sources, and reviewed our own in-house "geofile" for appropriate citations.

We shall appreciate hearing from users who are able to complement this display with information about desertification in China and current Chinese efforts to combat it in the western deserts.

# CHINA

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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

2

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

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 19,178.

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 N.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

CHAPPELL, J.R., JR.

1970

CLIMATIC CHANGE RECONSIDERED: ANOTHER LOOK AT 'THE PULSE OF ASIA'.

GEOGRAPHICAL REVIEW 60(3):347-373. GA 71B-0214.

'THE PULSE OF ASIA', ELLSWORTH HUNTINGTON'S CLASSIC ARGUMENT IN FAVOR OF CLIMATIC CHANGE AS AN IMPORTANT INFLUENCE IN HISTORY, IS RE-EXAMINED AND EVALUATED IN THE LIGHT OF SUBSEQUENT CRITICISMS AND NEW RESEARCH. HUNTINGTON'S MOST COMPETENT CRITIC, SIR AUREL STEIN, AGREED WITH HIS THEORY OF CLIMATIC PULSATIONS TO SOME EXTENT AND OFFERED NO REAL ALTERNATIVE EXCEPT THE 'FOSSIL ICE' HYPOTHESIS, WHICH IS STILL UNCONFIRMED. AN INCREASING RAIN-SHADOW EFFECT CAUSED BY THE RAPIDLY RISING MOUNTAINS SURROUNDING THE TARIM BASIN AND POLITICAL FACTORS SEEM TO BE ONLY SUBSIDIARY CAUSES FOR THE WIDESPREAD EVIDENCE OF ABANDONED SETTLEMENTS AND DEAD VEGETATION THAT HUNTINGTON FOUND THERE. SEVERAL CONTEMPORARY SOVIET SCHOLARS, INCLUDING V.M. SINITSYN AND G.N. GUMILYOV, HAVE SUPPORTED, MODIFIED, AND ELABORATED THE BASIC PREMISES OF HUNTINGTON'S THEORY. THE WORK OF M. KH. BAIDAL ILLUSTRATES THE RELEVANCE OF CLIMATIC-CHANGE RESEARCH TO CURRENT AGRICULTURAL AND POLITICAL PROBLEMS. (AUTHOR)

TARIM BASIN/CLIMATIC CHANGE/HISTORY/AGRICULTURE/POLITICAL ASPECTS/CHINA/ DEGENERATION

10

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

11

LI, H.F.

1965

THE GENESIS AND DEVELOPMENT OF STABILIZED SAND DUNE SOILS IN THE CENTRAL EASTERN PART OF THE MOYUSU DESERT OF THE ORDOS PLATEAU (TRANSLATED TITLE).

ACTA PEDOLOGICA SINICA 13:66-76. SF(29)256.

FIXED SAND DUNES ARE WIDESPREAD AND COVERED WITH RICH NATURAL VEGETATION. THERE ARE FEW PERFECTLY DEVELOPED PROFILES. IN THE PAST THE SURFACE LAYER WAS ALTERNATELY SUBJECTED TO WIND EROSION AND SAND BURYING. THERE IS NO DIFFERENTIATION BETWEEN THE HUMUS HORIZON AND CALCIUM CARBONATE LAYER, BUT WELL DRAINED STABILIZED SAND DUNES HAVE A PROFILE DEVELOPMENT WITH A AND AB HORIZONS AND SOMETIMES AN INCIPIENT CALCIUM CARBONATE HORIZON. THE SOILS ARE CLASSIFIED INTO FOUR DEPENDING ON THE PREDOMINANCE OF ARTEMISIA ORDOSICA, A. FRIGIDA, EPHEDRA SINICA OR JUNIPERUS SABINA.

OALS/CHINA/SAND DUNES/SAND CONTROL/SOIL PROFILES/A HORIZON/SOIL CLASSIFICATIONS/ORDOS/VEGETAL RELATIONSHIPS

12

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

13

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

14

MURZAYEV, E.M.

1966

PRIRODA SIN TSZIANA I FORMIOROVANIIE PUSTYN TSENTRAL NOI AZII (NATURE OF SINKIANG AND FORMATION OF THE DESERTS OF CENTRAL ASIA). MOSCOW. TRANSLATED, 1967, BY

JOINT PUBLICATIONS RESEARCH SERVICE, WASHINGTON, D.C., AS JPRS 40299. 621 P. AVAILABLE CFSTI AS JPRS 40299 OR TT 67-30944. MGA 19.6-13.

RELIEF FEATURES OF SINKIANG PROVINCE AND OF THE DESERT AREA OF THE CHINESE PEOPLE'S REPUBLIC ARE DESCRIBED. CHARACTERISTICS OF EACH OF THE FOLLOWING ARE DISCUSSED: THE CLIMATE IN THE AREA, THE SURFACE WATERS, THE SOIL MANTLE AND VEGETATION COVER, AND, THE ANIMAL KINGDOM INHABITING THE AREA. THE HISTORY OF THE FORMATION OF THIS CENTRAL ASIAN LANDSCAPE IS GIVEN; RECENT GLACIATION IN THE REGION IS DISCUSSED. AN EXTENSIVE BIBLIOGRAPHY OF SOURCE MATERIAL IS INCLUDED.

SINKIANG/CENTRAL ASIA/CHINA/CLIMATE/BIBLIOGRAPHIES/TRANSLATIONS/ SURFACE WATERS/SOIL SURFACES/ANIMAL POPULATIONS/GLACIAL GEOLOGY/ LANDFORMS/VEGETATION/OALS

15

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 DIMINUTION 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.

KWIC DE 20/QUATERNARY PERIOD/OALS/DESERTS/ARID LANDS/HISTORY/ PALEOCLIMATOLOGY/GLACIERS/WATER SUPPLY/WATER SOURCES/RIVER BASINS/ TARIM BASIN/BASINS/CLIMATIC GEOMORPHOLOGY/CLIMATIC CHANGE/ DESERTIFICATION/DESICCATION/TAKLA MAKAN DESERT/CHINA

16

PETROV, M.P.

1958

AFFORESTATION AND SAND FIXATION IN CHINESE PEOPLES' REPUBLIC (TRANSLATED TITLE).

LESNOE KHOZIAISTVO 8.

AFFORESTATION/SAND CONTROL

17

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

18

PETROV, M.P.

1966 - 1967

PUSTYNI TSENTRAL NOI ASII (DESERTS OF CENTRAL ASIA).

NAUKA, LENINGRAD. 2 VOLS. 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

19

RICHARDSON, S.D.

1966

FORESTRY IN COMMUNIST CHINA.

JOHNS HOPKINS PRESS, BALTIMORE. 255 P.

FORESTRY

20

SALTER, C.L. ED.

1973

DOING BATTLE WITH NATURE: LANDSCAPE MODIFICATION AND RESOURCE UTILIZATION IN THE PEOPLE'S REPUBLIC OF CHINA, 1960-1972.

UNIVERSITY OF OREGON, ASIAN STUDIES COMMITTEE, OCCASIONAL PAPER 1. 96 P.

THIS ANNOTATED BIBLIOGRAPHY OF 619 ITEMS INCLUDES SUCH TOPICS AS: AGRICULTURAL TECHNOLOGY, LAND RECLAMATION, INDUSTRY, INDUSTRIAL WASTES, MAXIMIZING RESOURCES, WATER RESOURCES, AFFORESTATION, IRRIGATION, DESERT, AND WATER CONSERVANCY. SUBJECTS OF INTEREST ARE INDEXED AND A SHORT SUMMARY OF EACH REPORT IS GIVEN. SINKIANG, NORTHWEST CHINA, INNER MONGOLIA ARE INCLUDED.

OALS/KWIC FE 1/CHINA/DESERTS/BIBLIOGRAPHIES/LANDSCAPING/LAND USE/ NATURAL RESOURCES/ENVIRONMENTAL ENGINEERING/LAND MANAGEMENT/LAND RECLAMATION/RESOURCES/SINKIANG/AGRICULTURE/LAND RESOURCES/WATER RESOURCES/AFFORESTATION

21

TANG, H.K.

1961

RELATIONSHIP BETWEEN DISTRIBUTION OF VEGETATION AND GROUND WATER IN ARID AND SEMI-ARID AREAS OF CHINA (TRANSLATED TITLE).

TU JANG 7:34-38. TRANSLATED 1968 AND AVAILABLE NTIS AS JPRS 45823:43-53. MGA 20.11-654.

DESCRIBES A SURVEYED 40 SQUARE KM AREA WITH AN EXTREMELY ARID CLIMATE (ANNUAL RAINFALL LESS THAN 10 MM) IN THE ENVIRONS OF T O-K O-SUN HSIEN, SINKIANG PROVINCE. THE AREA INCLUDED THE GOBI SAND DUNES AND OASES WITH DEPTH TO GROUND WATER FLUCTUATING FROM ONE METER TO SEVERAL DECAMETERS. THE RELATIONSHIP BETWEEN VEGETAL COVER AND GROUND WATER IS PRESENTED. FIVE MAIN DIVISIONS OF THE AREA BY DEPTH TO GROUND WATER AND THE CORRESPONDING PLANT COVER ARE GIVEN, AND EACH DISCUSSED IN RELATION TO H AND SALINITY. RESULTS OF SIMILAR SURVEYS ALONG THE MIDDLE REACHES OF THE YELLOW RIVER IN INNER MONGOLIA ARE SIMILARLY PRESENTED AND DISCUSSED. AN ANNOTATED PROFILE OF VEGETATION AND GROUND WATER LEVEL IN THE ENVIRONS OF HO-SHUN-CHUANG ALONG THE INTERMEDIATE SHOALS IN INNER MONGOLIA IS SHOWN.

OALS/SINKIANG/CENTRAL ASIA/MONGOLIA/VEGETAL RELATIONSHIPS/GOBI/PLANT COVER/GROUNDWATER/WATER TABLE/SAND DUNES/DISTRIBUTION PATTERNS

22

VITALE, C.S.

1963

BIBLIOGRAPHY ON THE CLIMATE OF SINKIANG, CHINA.

U.S. WEATHER BUREAU, WASHINGTON, D.C. 41 P. AVAILABLE NTIS AS AD-660 813.

SIXTY-EIGHT SOURCES WITH ABSTRACTS AND AUTHOR, SUBJECT, SERIAL, AND SUBJECT DATE INDEXES WERE COMPILED FROM MATERIAL DATING PRIMARILY FROM 1930-1960. DUE TO POOR METEOROLOGICAL COVERAGE, SOURCES WITH DATA FOR VERY SHORT OR OLDER PERIODS OR FROM NARRATIVE BOOKS ON THE WHOLE OF CHINA WERE USED TO OBTAIN AS MUCH MATERIAL AS POSSIBLE. MUCH OF THE MATERIAL WAS OBTAINED FROM THE U.S. WEATHER BUREAU LIBRARY.

OALS/AID/KWIC WC 46/BIBLIOGRAPHIES/ABSTRACTS/MAPS/CLIMATOLOGY/CLIMATE/CLIMATIC DATA/CHINA/SINKIANG

23

WANG, C.-W.

1961

THE FORESTS OF CHINA, WITH A SURVEY OF GRASSLAND AND DESERT VEGETATION.

HARVARD UNIVERSITY, CAMBRIDGE, MASSACHUSETTS, MARIA MOORS CABOT FOUNDATION FOR BOTANICAL RESEARCH, PUBLICATION 5. 313 P.

A GENERAL SURVEY IS MADE ON THE GRASSLAND AND DESERT VEGETATION OF THE GREAT WESTERN INTERIOR. THE MAJOR VEGETATION TYPES DISCUSSED INCLUDE: THE GRASSLAND, WOODLAND MEADOWS, MUSKEGS AND SAND DUNES EAST OF HANHAI GOBI IN JEHOL AND THE NORTHEASTERN PROVINCES; STEPPE OF SILINGOL AND ULANCHAP, AND DESERTS OF ORDOS AND ALASHAN SOUTH OF HANHAI GOBI IN CHAHAR, SUIYUAN AND NINGHSIA PROVINCES; MOUNTAIN STEPPE AND MEADOW OF ALTAI; DESERT BASINS AND OASES OF DZUNGARIA AND TARIM; AND DESERT ALPINE VEGETATION OF SITSANG. CHAPTER VII: GRASSLAND AND DESERT, P. 171-210. INCLUDES BIBLIOGRAPHY (P. 251-274); INDEX OF GEOGRAPHIC NAMES (P. 277-282); INDEX OF LATIN PLANT NAMES (P. 283-313).

FORESTS/GRASSES/WOODLAND/SAND DUNES/BASINS/OASES/STEPPE/TARIM BASIN/DZUNGARIA/VEGETATION TYPES/ORDOS

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