

- Educational Low-Priced Books Scheme, British Council: Book Coupons Programme; and British Council: Resale Scheme. Contact your local British Council representative;
- Head, Information and Documentation, Swedish Agency for Research Cooperation with Developing Countries;
- Third World Academy of Science, Donation Programme;
- CTA.

26.4 Information Sources on Land Drainage

26.4.1 Tertiary Literature

Tertiary literature gives information on abstract journals, journals, addresses of institutions, dictionaries, etc. It may have titles such as Sources of Information on An example is:

Naber, G.

Drainage : An Annotated Guide to Books and Journals

Wageningen, ILRI, 1984. 37 p.

Gives an overview of sources of information, abstract journals, journals, bibliographies, directories, dictionaries, and books. Several titles are illustrated by their front cover.

26.4.2 Abstract Journals

Abstract journals list titles of publications with an abstract of their contents. Examples are:

- *Soils and Fertilizers*
Published twelve times a year by CABI. Subscription price U.S. \$680/year.
- *Irrigation and Drainage Abstracts*
Published five times a year by CABI. Subscription price U.S. \$160/year.
- *Bibliography of Irrigation, Drainage and Flood Control*
Published once a year by the International Commission on Irrigation and Drainage/ICID, India.

26.4.3 Databases

The book *Online Databases in the Medical and Life Sciences*, published by Elsevier, lists various interesting databases and their products.

The following databases cover the field of tropical agriculture. Although not entirely concerned with land drainage, they will be of interest to land drainage engineers. They are also available on compact disc:

- **AGRICOLA**, produced by the U.S. Department of Agriculture, National Agricultural Library;

- **AGRIS**, International Information System for the Agricultural Sciences and Technology, produced by AGRIS Coordinating Centre, FAO;
- **CAB Abstracts**, produced by CAB International, available online in DIALOG, DIMDI, and ESA. Contains about 2 million citations, with abstracts, to the worldwide literature in the agricultural sciences and related areas of applied biology;
- **PASCAL Agroline**, produced by the Centre National de la Recherche Scientifique, Centre de Documentation Scientifique et Technique (CNRS/CDST), Institut National de la Recherche Agronomique. Also produces an abstract journal entitled PASCAL Thema 280: Sciences agronomiques, productions végétales;
- **TROPAG (ATA)**, produced by the Royal Institute of the Tropics/KIT. Also produces an abstract journal entitled Abstracts on Tropical Agriculture.

26.4.4 Hosts or Information Suppliers

Hosts are institutions that offer online databases containing titles of publications. Examples are:

- **DIALOG**, Dialog Information Services Inc.;
- **DIMDI**;
- **ESA-IRS**, European Space Agency Information Retrieval Service.

26.4.5 Journals

The Bibliography of Irrigation, Drainage, and Flood Control, published by ICID, lists a number of journals that contain articles on drainage. Details of some of these journals are given below.

Journal of Irrigation and Drainage Engineering

Published six times a year by the American Society of Civil Engineers, Irrigation and Drainage Division.

Editor: Otto J. Helweg. Subscription U.S. \$110.

The journal covers all phases of irrigation and drainage engineering, hydrology, and related water-management subjects such as watershed management, weather modification, water quality, groundwater and surface water. The journal emphasizes new developments and research papers, as well as case studies and practical applications of engineering.

Irrigation and Drainage Systems : An International Journal

Published four times a year by Kluwer Academic Publishers.

Editor: M.G. Bos. Subscription U.S. \$80.

The journal covers the following topics: influence of the water supply on the planning and management of the irrigation system; design criteria of drainage systems; efficiency of irrigation water use; management of irrigation/drainage schemes; adaptation of irrigation/drainage schemes so as to avoid water-related diseases; influence of irrigation and drainage on the ecosystem.

Agricultural Water Management : An International Journal

Published eight times a year by Elsevier Science Publishing BV

Editor: J. van Schilfgaard. Subscription U.S. \$335.

The scope covers irrigation and drainage of cultivated areas; collection and storage of precipitation water in relation to soil properties and vegetation cover; the role of ground- and surface water in nutrient cycling; water-balance problems; exploitation and protection of water resources; control of flooding; water quality and pollution both by, and of, agricultural water; effects of land uses on water resources; water for recreation in rural areas; economic and legal aspects of water use.

ICID Bulletin : Irrigation, Drainage, and Flood Control = Bulletin CIID : irrigation, drainage, et maîtrise des crues

Published twice a year by ICID.

Editor: Dr. W. Nicholaichuk. Subscription U.S. \$30.

The objectives of ICID are to stimulate and promote the development and application of the art, science, and technique of engineering, agriculture, economics, ecology, and social science in managing water and land resources for irrigation, drainage, flood control and river training and/or for research in a more comprehensive manner adopting up-to-date techniques. Articles on these subjects are published in the ICID Bulletin, which includes the addresses of the active ICID National Committees.

Agribook Magazine/Drainage Contractor

Published five times a year by AIS Communication Ltd.

Editor: Peter Darbishire. Subscription U.S. \$12.

The journal covers practical aspects of land drainage. Gives a great deal of attention to installation equipment and techniques. Includes advertisements for equipment and materials.

Transactions of the ASAE

Published six times a year by the American Society of Agricultural Engineers/ASAE.

Editor of Soil and Water Division: Gary D. Bubenzer. Subscription U.S. \$160.

This journal contains six divisions of which the Division of Soil and Water is related to drainage.

Zeitschrift für Kulturtechnik und Landentwicklung = Journal of Rural Engineering and Development

Published six times a year by Paul Parey.

Editor: Dr Bernhard Scheffer. Subscription U.S. \$130.

Nearly all the articles are in German.

Irrigazione e drenaggio : organo del centro internazionale di studi sull'irrigazione

Published by Edagricole S.p.A.

Editor: Prof. Ariosto Degan. Subscription U.S. \$25.

All articles are about irrigation and drainage and are written in Italian. Also includes articles on the non-Italian situation.

A selection of journals covering disciplines related to drainage (e.g. soil science, hydrology, agronomy, agricultural engineering, water resources, erosion, and soil conservation) are listed below:

- Agronomy Journal, published by the American Society of Agronomy.
- Crop Science, published by the Crop Science Society of America.
- Journal of Hydrology, published by Elsevier.
- Agricultural Engineering, published by the American Society of Agricultural Engineers.
- Journal of Soil Science, published by Blackwell.
- Soil Science Society of America Journal.
- Soil Science, published by Williams and Wilkins.
- Soil Use and Management, published by Blackwell.
- Journal of Soil and Water Conservation, published by the Soil and Water Conservation Society.
- Water Resources Bulletin, published by the American Water Resources Association.
- Water Resources Research, published by the American Geophysical Union.

26.4.6 Newsletters

Many international organizations publish newsletters that report their current activities. Examples are:

Land and Water International

Published three times a year free of charge by Netherlands Engineering Consultants/ NEDECO.

The newsletter reports on land and water projects, on-going or complete anywhere in the world.

Land and Water

Newsletter for field staff of the Land and Water Development Division, FAO.

ODU Bulletin

Quarterly newsletter of the Overseas Development Unit of Hydraulics Research/ HR-ODU.

GRID, Magazine of the IPTRID Network is published twice a year.

26.4.7 Books

1992

Ochs, W.J. and B.G. Bishay

Drainage guidelines

World Bank, 1992. 186 p. Technical Paper No. 195

This book provides research results on, and experience with, agricultural drainage. It has

been developed to guide Bank staff, consultants and borrowing-country technicians as they work through the project cycle, seeking to assist planners and designers, as well as those responsible for implementation and follow-up. The guidelines were designed to help improve the quality of drainage measures for both irrigated and rainfed agriculture under a wide range of climatic conditions, with the core objectives of improving the sustainability of agricultural lands and of protecting the environment. The relationship between water management and agricultural production is crucial. Thus, sound drainage investments must be considered when planning and developing projects.

Smart, P. and J.G. Herbertson (Eds.)

Drainage design

Blackie Academic, 1992. 298 p.

A review of the principles and methods of drainage, with emphasis on design. North American, European Community, and United Kingdom practice and the practice in developing countries are included throughout. The book covers drainage applications which may be faced by civil or agricultural engineers.

1990

Schultz, B.

Guidelines on the construction of horizontal subsurface drainage systems

International Commission on Irrigation and Drainage, New Delhi. 1990. 236 p.

These guidelines give general criteria and recommendations for the construction of horizontal subsurface drainage systems. The book starts with an inventory of subsurface drainage systems and then briefly reviews design aspects. It gives attention to drainage materials and to equipment to install the drains. It then recommends construction methods, and describes operation and maintenance. Finally, it treats the cost-benefit analysis of projects. Includes a glossary.

1989

Amer, M.H. and N.A. de Ridder

Land drainage in Egypt

Drainage Research Institute, Cairo. 1989. 377 p.

In 1976, an Egyptian-Dutch Advisory Panel on Land Drainage was established. Its objective was to provide the Egyptian Government with integrated advice in its efforts to control waterlogging and salinity. Five separate projects were formulated. The experience gained from them has led to a better understanding of Egypt's drainage problems and of the remedial measures that can be taken.

The book reflects seven different issues: Drainage survey and design practices; Drainage technology; Operation and maintenance of drainage systems; Vertical drainage feasibility in the Nile Valley; Re-use of drainage water for irrigation; Economic evaluation of drainage projects; Institutional and management aspects of drainage projects.

The book differs from many others in that it provides in-depth guidance to practising engineers in planning and designing drainage systems. It presents new approaches to the drainage of problem areas (unstable soils, heavy soils, artesian conditions), which are found, not only in Egypt, but all over the world.

1076

International Commission on Irrigation and Drainage

Planning the management, operation, and maintenance of irrigation and drainage systems : A guide for the preparation of strategies and manuals

World Bank, Washington. 1989. 150 p. Technical Paper No. 99.

This book was prepared as a reference document for organizations that are responsible for the operation and maintenance of irrigation and drainage systems. Its aim is to assist such organizations in developing strategies and preparing plans for proper and effective operation and maintenance. It provides the basis for the preparation of manuals needed by managers and staff in performing necessary activities at the proper time. The guide provides a comprehensive list of issues that should be addressed in such manuals, and lists published materials and working papers that will assist in the formulation of plans for operation and maintenance.

1988

Hoorn, J.W. van

Agrohydrology – Recent developments : Proceedings of the Symposium Agrohydrology at the International Agricultural Centre/IAC Wageningen, The Netherlands, 29 September – 1 October 1987.

Elsevier, Amsterdam. 1988. 550 p. Agricultural Water Management. Vol. 14.

About half of the papers are about drainage, some of them dealing particularly with the effects of drainage on crops and farm management; others deal with such subjects as preferential flow and the drainage of special soils.

Theme 1: Effects of drainage on crop and farm management (contains 22 papers);

Theme 2: Water conservation; Theme 3: Hydrology of nature reserves; Theme 4: Re-use and disposal of drainage waters from irrigated areas.

1987

Eggelsman, R.

Subsurface drainage instructions. 2nd Edition.

Parey, Hamburg. 1987. 336 p. Bulletin of the National Committee of the Federal Republic of Germany. ICID. No. 6.

English translation of Dränanleitung für Landbau, Ingenieurbau und Landschaftsbau, published in 1981.

Contents: General subjects; Water and soil; Field investigations; Subsurface drainage methods; Subsurface drainage efficiency; Hydraulic calculation; Drainage project-technical planning principles; Drainage materials; Construction of subsurface drainage; Maintenance of drainage.

The subject of saline soils has also been treated in view of the absolute necessity for drainage to complement irrigation in many developing countries.

Framji, K.K., B.C. Garg, and S.P. Kaushish

Design practices for covered drains in an agricultural land drainage system : A worldwide survey

International Commission on Irrigation and Drainage, New Delhi. 1987. 438 p.

The book consists of three parts:

- Part I is a review of the various aspects of engineering design (materials, design criteria, spacing, depth, and dimensions);
- Part II contains the country reports from Canada, China, Czechoslovakia, Egypt, Federal Republic of Germany, France, German Democratic Republic, Hungary, India (Maharashtra), Iraq, Ireland, Japan, Jordan, Netherlands, Pakistan, Poland, Portugal, Romania, and the U.S.A.;
- Part III contains the ASAE Engineering Practice No. 369: Design of agricultural drainage – Pumping plants. This gives principles and practices useful to engineers in the planning and design of pumping plants for the drainage of agricultural land.

Vos, J. (Ed.)

Proceedings, Symposium 25th International Course on Land Drainage : Twenty-five years of drainage experience

ILRI, Wageningen. 1987. 353 p. Publication 42.

This book compiles the results of the Silver Jubilee Symposium, which was held to mark the occasion of the 25th anniversary of the annual International Course on Land Drainage. During the Symposium, five major topics were discussed in separate sessions: Drainage in the humid temperate regions; Drainage in the (semi-)arid regions; Drainage in the humid tropical regions; Drainage machines and materials; Organization of the maintenance of drainage projects.

The topics were introduced by one or two keynote speakers, after which a number of country papers were presented and discussed.

1986

Farr, E. and W.C. Henderson

Land drainage

Longman, London. 1986. 251 p. (Longman Handbooks on Agriculture).

The aim of this book is to provide, in practical and theoretical terms, a broad view of the subject of land drainage. Some basic knowledge of the natural processes that influence land and soil fertility is provided. The authors have attempted to find a balance between sound drainage techniques and design theories. The book describes simply, and with a minimum of calculation, the principles of scientific design and where to apply them. It includes a comprehensive guide to practical land drainage techniques.

Martínez Beltrán, J.

Drenaje agrícola (in Spanish)

Min. de Agricultura, Pesca y Alimentación, Madrid. 1986. Vol. 1. (Series de ingeniería rural y desarrollo agrario. Manual técnico; No. 5).

This book reviews the basic principles governing groundwater flow and soil moisture fluxes. It discusses drainage problems and their possible solutions, using the concept of salt and water balances. It treats drain spacing equations, the determination of soil hydraulic properties, and subsurface drainage criteria. It covers the design, installation, and maintenance of pipe drainage systems. The book concludes with a chapter on salt-affected soils and leaching techniques.

1078

Rao, K.V.G.K., O.P. Singh, and R.K. Gupta

Drainage investigations for salinity control in Haryana

Central Soil Salinity Research Institute, Karnal. 1986. 95 p. Technical Bulletin 10.
Central Soil Salinity Research Institute.

The contents of this Bulletin are based on five years of investigations conducted on three subsurface drainage pilot areas in representative saline areas in Haryana State, India. Experiments were performed to resolve the urgent issues on the depth and spacing of drains, drainage materials, and efficient ways of utilizing poor-quality groundwaters for the leaching of excess soluble salts.

1984

Centre National du Machinisme Agricole, du Génie Rural, des Eaux et des Forêts
(Antony) Division Drainage et Assainissements Agricoles ONIC – Ministère de
l'Agriculture (Paris) Comité de Pilotage National de l'Opération Drainage

L'expérimentation en drainage agricole (in French)

CEMAGREF, Antony. 1984. 95 p. Etudes du CEMAGREF, No. N.511.

The first part of the report sets out the present technological drainage problems and defines the lay-out of experimental fields. It is explained how experiments should be executed in order to find answers to the questions raised by the technicians. The criteria for selecting suitable areas for experiments are treated. An example of an experiment in Bresse de l'Ain is given. The second part gives an outline of a protocol to be adhered to in drainage experiments. The third part describes how data collected from field experiments should be interpreted.

Three documents are appended to the first part: The first is entitled 'Manual for Drainage Experiments'; The second deals with intensive hydraulic experiments; The third gives an example of an agreement for the set-up of an experiment and tells how to use the results of the experiments.

Framji, K.K., B.C. Garg, and S.P. Kaushish

Design practices of open drainage channels in an agricultural land drainage system:
A worldwide survey

ICID, New Delhi. 1984. 343 p.

This volume on open drainage channels consists of two parts:

Part I is devoted to a general review of the design aspects of open drainage channels: system layout, design capacity, channel shape, roughness coefficient, permissible channel velocity, longitudinal channel slope, side slope; Part II contains the country reports of Australia, Bangladesh, Canada, Colombia, Czechoslovakia, Egypt, France, Federal Republic of Germany, German Democratic Republic, Great Britain, Greece, India, Iraq, Ireland, Japan, Malaysia, Morocco, Portugal, Saudi Arabia, Sudan, and the U.S.A.

Castle D.A., J. McCunnall, and I.M. Tring

Field drainage : Principles and practices

Batsford Academic and Educational Ltd., London, United Kingdom. 1984. 250 p.

The book follows the field drainage design process systematically through the stages of the site survey and soil examination; choice of drain layout; depth and spacing;

and determination of pipe sizes. The main theoretical aspects of water movement in soils and pipe hydraulics are covered. The presentation throughout concentrates on demonstrating how theory is put into practice. Sections are devoted to specific techniques such as pumped drainage, and problems such as ochre and salinity. The concluding chapters deal with the use of maps and plans, and with legislation and conservation.

A special feature of the book is its presentation of new ideas on the design of field drainage pipe systems, arising from research by the Ministry of Agriculture Fisheries and Food/MAFF, Field Drainage Experimental Unit.

1983

Food and Agriculture Organisation of the United Nations

Guidelines for the preparation of irrigation and drainage projects. Revised Edition.
FAO, Rome. 1983. 31 p.

Gives guidelines for the main text of a feasibility study, which provides the answers to questions that might be raised in the course of project appraisal.

Smedema, L.K., and D. Rycroft

Land drainage : Planning and design of agricultural drainage systems

Batsford Academic and Educational Ltd., London, United Kingdom. 1983. 376 p.

The text discusses the diagnosis of agricultural drainage problems and their solutions, based on an understanding of the physical principles involved. Land drainage is treated as being a field of applied soil physics and applied hydrology. All major drainage problems are covered, each in its particular environment and field of application:

Groundwater drainage; Watertable control; Surface drainage of sloping and flat lands; Shallow drainage of heavy land; Drainage for salinity control in irrigated land; Drainage and reclamation of polders; Drainage for seepage control; Main drainage: design discharges, canal design, outlets.

The book stresses the universal relationships between the main design variables and soil, climatology, and other relevant environmental conditions.

1982

Baumli, G.R.

Principles of project formulation for irrigation and drainage projects

American Society of Civil Engineers, New York. 1982. 132 p.

This report sets forth the generally accepted and proven principles of project formulation, and provides a guide and checklist for the planning and review of irrigation and drainage projects.

Project formulation involves a series of steps starting with the determination of objectives by the decision-makers, identification and definition of problems and needs, evaluation of available resources, development of alternative means of resolving problems and meeting the needs, evaluation of the alternatives, and selection and implementation of the recommended plan. For all these steps, guidelines are given.

1080

Wehry, A., I. David, and T.E. Man

Probleme actuale in tehnica Drenajului (in Romanian)

Facula, Timisoara. 1982. 237 p.

Actual problems in the drainage technique. This Romanian book contains a summary in English and consists of three parts: Methods and models of calculation in subsurface drainage; Hydraulic and technological problems of filter materials; Design of drainage systems.

1981

Concaret, J.

Drainage agricole : théorie et pratique (in French)

(= Agricultural drainage : Theory and practice)

Chambre Régionale d'Agriculture de Bourgogne, Dijon. 1981. 509 p.

Five sections and four appendices deal with the techniques and applications of drainage, equipment and material, drainage networks and their maintenance. The book also includes pedological and hydrological background information, historical and legal aspects, and methods of soil analysis in relation to drainage problems.

Framji, K.K., B.C. Gary, and S.D.L. Luthra (Eds.)

Irrigation and drainage in the world : A global review. 3rd Edition.

ICID, New Dehli. 1981. 2 Volumes.

An introductory chapter reviews, in global perspective, the object, role, and development of irrigation and drainage, and the demographic trends in less developed and more advanced countries vis-à-vis the related food production, the availability of arable land, and the development and use of water resources by 2000 A.D. Briefly touched upon are economics, financing, and appraisal of irrigation and drainage projects, with some general conclusions at the end. Material on each country is arranged under the following headings: Physiography; Climate and rainfall; Population and size of holdings; Land resources; Water resources; Brief history of irrigation and drainage; Irrigation and drainage methods used; Statistics relating to irrigation and drainage; Important projects; Field water management; Problems relating to irrigation and drainage; Present developments, future plans, and potentials; Administration of irrigation and drainage projects; Economics of irrigation and drainage projects; Financing of irrigation and drainage projects; New technology and its application; Water laws and inter-state agreements; International water agreements and treaties; Research on irrigation and drainage; Other features.

1980

Bowler, D.G.

The drainage of wet soils

Hodder and Stoughton, London. 1980. 259 p.

Contents: Soils in relation to drainage; The water properties of soils; Hydrology of drainage systems; Surveying for drainage systems; The use of aerial photography in farm drainage practice; Surface drainage; Subsurface drainage; Mole drainage; The drainage of peat soils; Pumping to remove drainage water; Ditching and pipe trenching

machinery; Some important management and maintenance practices; The use of subsurface drainage systems for water harvesting.

Parker, T.K.

Drainage system design

Indian Agricultural Research Institute, New Delhi. 1980. 193 p. Design Manual No. 1. Water Technology Centre.

A detailed description in both practical and theoretical terms of a drainage system designed in-house for a research farm. The manual is intended both as a guide to the design and construction of similar systems and as a study model.

The Drainage Contractor. Black Book II

Agri-Book Magazine, Exeter. 1980. 64 p. Drainage Contractor Special Number 2.

A compendium of manufacturers and distributors of back-fillers and drainage machines (e.g. wheel-type, chain-type, trenchless machines). A photograph of each machine is accompanied by a description and specifications.

1979

Beers, W.F.J. van

Some nomographs for the calculation of drain spacings. 3rd Edition.

ILRI, Wageningen. 1979. 48 pp. Bulletin 8.

Also includes nomographs for non-steady state flow and for homogeneous soil with an impermeable layer at great depth. In addition, the author elaborates a specific type of nomograph meant to help determine more accurately the effect of various factors on drainage systems performance.

Drainage principles and applications

ILRI, Wageningen. 1979. Volume 1: 241 p.; Volume 2: 374 p.; Volume 3: 364 p.; Volume 4: 470 p. ILRI Publication 16.

This four-volume book on drainage principles and applications is based on lectures delivered at the International Course on Land Drainage, which is held annually by the International Institute for Land Reclamation and Improvement, Wageningen, The Netherlands. The book presents the basic principles of land drainage with applications.

Although each volume can be used separately, reference is often made to the other volumes to avoid repetition. The four volumes complement one another and provide a coverage of all the various topics useful to those engaged in drainage engineering.

Also available is a Spanish version published in 1977, entitled:

Principios y aplicaciones del drenaje (en cuatro volúmenes).

1978

Drainage manual : A water resources technical publication : A guide to integrating plant, soil, and water relationships for drainage of irrigated lands

United States Bureau of Reclamation/USBR, United States Department of the Interior/USDI, Washington D.C. 1978. 286 p.

Engineering tools and concepts useful in planning, constructing, and maintaining drainage systems for successful long-term irrigation projects.

1082

A ready reference for making accurate estimates of drainage requirements. All methods and techniques covered have proven to be very satisfactory through observed field conditions in irrigated lands throughout the world.

1975

Grassi, C.J.

Manual de drenaje agrícola (= Agricultural drainage manual) (in Spanish).

Centro Interamericano de Desarrollo Integral de Aguas y Tierras/CIDIAT, Mérida. 1975. 197 p.

Contents: Introduction; Drainage and its relation to the soil and the crops; Movement of water through the soil; Sources of excess water; Drainage surveys and investigations; Groundwater surveys; Determining hydraulic conductivity; Permeability studies; Diagnosis of drainage problems; Flow of water towards the drain; Drainage methods; Some construction aspects of drainage systems.

Christiansen, J.E. and C.J. Grassi

Manual de drenaje en tierras de riego (= Drainage manual for irrigated lands) (in Spanish)

Departamento de Desarrollo Regional de la Organización de Estados Americanos/OAS, Mérida. 1975. 150 p. Publicación del Centro Interamericano de Desarrollo Integral de Aguas y Tierras/CIDIAT.

The manual focusses on drainage problems in irrigation projects in Latin America. Soil physical properties and their relation to drainage are discussed. The next chapters discuss the theoretical background to salinity control and the possible sources of excess water in irrigated fields.

1974

Schilfgaard, J. van, (Ed.)

Drainage for agriculture

American Society of Agronomy, Madison. 1974. 700 p. Agronomy No. 17.

Contents: Drainage and crop production; Current drainage practices; Materials and methods; Saturated flow theory and its application; Unsaturated flow theory and its application; Salts and water movement; Quality of drainage water; Models and analogues for the study of groundwater flow; Determining soil properties; Water management systems.

1973

Drainage of agricultural land : A practical handbook for the planning, design, construction, and maintenance of agriculture drainage systems

Water Information Center, Port Washington. 1973. 430 p.

The text of Drainage of Agricultural Land is a faithful reproduction of Section 16, 'Drainage of Agricultural Land' of the National Engineering Handbook, issued in 1971 by the Soil Conservation Service, U.S. Department of Agriculture. The only changes by the publisher are the correction of a few minor typographical errors, the

renumbering of pages, the modification of type faces on selected pages, and the addition of an index.

Contents: Principles of drainage; Drainage investigations; Surface drainage; Subsurface drainage; Open ditches for drainage – design, construction, and maintenance; Dikes; Drainage pumping; Drainage of organic soils; Drainage of tidal lands.

1970

Kinori, B.Z.

Manual of surface drainage engineering

Elsevier, Amsterdam. 1970. 224 p.

The aim of the manual is to bring together for the practical engineer the wide variety of knowledge about main drainage systems. Theoretical explanations are given briefly, the emphasis being placed on practical methods for the design of surface drainage projects.

The first part of the manual discusses: Open channel hydraulics; Scour; Stability of earth channels; The water drop.

The second part discusses: The design and construction of channel linings. The appendix treats the biological protection of waterways and drainage channels in Mediterranean and semi-arid conditions.

26.4.8 Institutions

Some of the main institutions working in land drainage are listed below in the alphabetical order of the country in which they are located. More names and addresses of institutions can be found in the following two directories.

Agricultural research centres : A world directory of organizations and programmes. 8th Edition.

Longman, Harlow. 1986. 2 Volumes. 1138 p.

- Of the centres listed in this directory, about one hundred of them are totally or partly involved in research on land drainage.

Directory of land reclamation and water management organizations in the world.

ICID, New Delhi. 1979. 261 p.

- This directory is an attempt to list all organizations concerned directly or indirectly with irrigation, drainage, and flood-control projects, multipurpose and river-bank development, and overall planning of water resources.

Belgium

National Institute of Agricultural Engineering = Rijksstation voor Landbouwtechniek

Van Gansberghelaan 115, Ghent, B-9220 Merelbeke, Belgium.

Annual Report available.

Canada

Centre for Drainage Studies

McGill University, MacDonald College, Ste. Anne De Bellevue, Quebec, Canada
H9X 1C0.

Egypt

Drainage Research Institute

Delta Barrage, El-Kanater, Egypt.

Finland

Finnish Field Drainage Centre

Simonkatu 12 A, Helsinki SF-00101, Finland.

France

**Centre National du Machinisme Agricole, du Génie Rural des Eaux et des Forêts/
CEMAGREF**

Parc de Tourvoie, B.P. 121, Antony 92160, France.

India

Central Soil Salinity Research Institute, Karnal 132001, India.

International

FAO's Land and Water Development Division

- Publishes Irrigation and Drainage Papers. Up to now, forty six papers have been published.

International Council for Irrigation and Drainage/ICID

- Many countries in the world have a National ICID Committee. Addresses can be found in the ICID Bulletin. ICID also publishes special publications and the Bibliography of Irrigation, Drainage, River Training, and Flood Control.

International Program for Technology Transfer in Irrigation and Drainage/IPTRID
c/o Hydraulics Research, Wallingford, U.K.

Netherlands, The

International Institute for Land Reclamation and Improvement/ILRI

Landinrichtingsdienst (= Government Service for Land and Water Use)/LD

P.O. Box 20021, 3502 LA Utrecht, The Netherlands.

Annual Report available.

Pakistan

International Waterlogging and Salinity Research Institute/IWASRI

13 West Wood Colony, Thoker Niaz Beg, Lahore, Pakistan

United Kingdom

Hydraulics Research, Overseas Development Unit, Wallingford, U.K.

Cranfield Institute of Technology, Silsoe College, Bedford, U.K.

United States of America

American Society of Agricultural Engineers/ASAE

- Almost every year, ASAE organizes a National Drainage Symposium. The

proceedings of these symposia are available through ASAE. ASAE also publishes Agricultural Engineering Papers, many of which are about drainage.

American Society of Civil Engineers/ASCE

Soil Conservation Service

P.O. Box 2890, Washington DC, 20013, U.S.A.

U.S. Bureau of Reclamation/USBR

Denver Federal Center, Denver, Colorado CO 80255, U.S.A.

U.S. Salinity Laboratory

4500 Glenwood Drive, Riverside, California CA 92501, U.S.A.

26.4.9 Drainage Bibliographies

Crook, C.B.

Drainage of agricultural land : An annotated bibliography of selected references 1956-1964

USDA, Washington. 1968. 524 p. (National Agricultural Library, Library list No. 91).

Davis, E.G. and M.L. Gould

Drainage of agricultural land : A bibliography of selected references

USDA, Washington. 1956. 200 p. (Miscellaneous Publication 713).

Gupta, S.K. and I.C. Gupta

Global research on drainage in agriculture : An annotated bibliography 1960-1986

Naurang Rai Concept Publishing Co., New Delhi. 1987. 659 p.

Vries, C.A. de and B.C.P.M. van Baak

Drainage of agricultural land : A bibliography

Wageningen: ILRI, 1966. 28 p. (Bibliography No. 5).

26.4.10 Multilingual Dictionaries

Kennedy, M.N.

A Handbook of irrigation and drainage terms: English-French = Irrigation et drainage: guide pratique des termes, Français-Anglais

Newhouse, Bishop's Waltham. 1981. 44 p.

Kosuth, P.

Vocabulaire de l'hydraulique du drainage agricole

CEMAGREF, Antony. 1985. 39 p. (Technologies de l'agriculture; études du CEMAGREF No. N.524). Terms in German, English, Spanish, French, and Russian.

Papadopoulos, G.E.

Multilingual technical dictionary on irrigation and drainage: Greek-English-

French-German = Dictionnaire technique multilingue des irrigations et du drainage: Grec-Anglais-Français-Allemand = Fachwörter für Bewässerung und Entwässerung: Griechisch-Englisch Französisch-Deutsch
ICID, Athens. 1975. 1060 p.

Deutsches Nationales Komitee der International Commission for Irrigation and Drainage (Bonn)

Multilingual technical dictionary on irrigation and drainage: English-French-German = Dictionnaire technique multilingue des irrigations et du drainage: Anglais-Français-Allemand = Fachwörter für Bewässerung und Entwässerung: Englisch-Französisch-Deutsch
Franckh'sche Verlagshandlung, Stuttgart. 1971. 948 p.

Shybladzay, K.K.

Multilingual technical dictionary of irrigation and drainage: Russian-English-French = Dictionnaire technique multilingue des irrigations et du drainage: Russe-Anglais-Français
ICID, Moskva. 1978. 543 p.

Toyoda, H.

Technical dictionary on irrigation and drainage
Japan International Cooperation Agency, Tokyo. 1977. 450 p.
Irrigation and Drainage Course. Uchihara. International Agricultural Training Centre.

26.4.11 Proceedings of International Drainage Symposia

The proceedings of five international workshops, symposia, or conferences on land drainage have been published so far. Each contains a list of participants and their addresses. The titles are:

Wesseling, J. (Ed.)

Proceedings of the International Drainage Workshop, 16-20 May 1978, Wageningen, The Netherlands
ILRI, Wageningen. 1979. 731 p. (Publication 25).

Proceedings 2nd International Drainage Workshop, Washington D.C., U.S.A., 5-11 December 1982

Corrugated Plastic Tubing Association/CPTA, Carmel. 1982, 240 p.
(CPTA; 7 Hensel Court, Carmel, Indiana IN 46032, U.S.A.).

Saavaliainen, J. and P. Vakkilainen (Eds.)

Proceedings of International Seminar on Land Drainage, 9-11 July 1986, Helsinki, Finland
Helsinki University of Technology, Department of Civil Engineering, Water Engineering. 1986. 503 p.

Proceedings Third International Workshop on Land Drainage, 7-11 December 1987
Ohio State University, Department of Agricultural Engineering, Columbus, Ohio
OH 43201, U.S.A., 1987. 750 p.

Lesaffre, B. (Ed.)

Fourth International Workshop Land Drainage = Quatrième séminaire
international drainage agricole, February 1990, Cairo, Egypt
CEMAGREF, Antony. 1990. 294 p.

Vlotman, W.F. (ed.). Proceedings 5th Technical Drainage Workshop,

Subsurface drainage on problematic irrigated soils : Sustainability and cost
effectiveness. IWASRI, Lahore, Pakistan, 1992. 3 Vol.

Almost every year ASAE organizes a National Drainage Symposium. The proceedings
of these symposia are available through ASAE.

26.4.12 Equipment Suppliers

- **M/s Phax Systems Ltd.**, Ivel Road, Shefford, Bedfordshire, SG17 5JU, U.K.
- **Thomas Scientific**, P.O. Box 99, Sweden Bora, NJ 08085-0099, U.S.A.
- **Eijkelkamp Agrisearch Equipment**, P.O. Box 4, 6987 ZG Giesbeek, The Netherlands.

26.4.13 Teaching and Training Facilities

M.Sc. Course on Soil and Water

Wageningen University of Agriculture.

Agricultural Water Management

Cranfield Institute of Technology, Silsoe College.

A 12-weeks course with course contents as follows: Irrigation, drainage, soil
conservation, water supply, storage methods, technical management. Leading to
a Certificate of Attendance.

Drainage and Land Reclamation Engineering

Cranfield Institute of Technology, Silsoe College.

Course on plant water relationship, soil and plant analysis, hydrology, soil
physics, soil mechanics, field drainage, reclamation, soil management, irrigation
engineering, water supply. Leading to an M.Sc. degree.

Soil and Water Engineering

Cranfield Institute of Technology, Silsoe College.

Course on soil-water relations, soil and plant analysis, hydrology, water
resources, soil physics, water flow in soil, soil mechanics, irrigation engineering,
drainage, soil conservation. Leading to a postgraduate diploma/M.Sc.