



A Bibliography on the River Nile

Vol. I

The River Nile and its Economic, Political,
Social and Cultural Role

An Annotated Bibliography

Terje Tvedt



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An Annotated Bibliography on the River Nile and its Economic, Political, Social and Cultural Role

- 3488 TITLES REGISTERED
- 1530 TITLES ANNOTATED
- BOOKS/ARTICLES/GREY PAPERS/PLANNING DOCUMENTS AND REPORTS INCLUDED
- ALL SCIENTIFIC DISCIPLINES REPRESENTED

It is more important than ever to understand the economic, political and cultural role of the River Nile. This book has been written in the belief that such a mighty river, running from the heart of Africa to the Mediterranean and crossing the borders of ten countries comprising more than 300 million people, deserves an extensive, multidisciplinary bibliography, presenting in one book, what has been said about her.

The Nile has intrigued people, historians and poets since the days of Cheops up to the present day and will continue to be at the heart of regional economy, politics and culture in the decades and centuries ahead. This most famous of all famous rivers has been described in the ancient stories of Herodotus and in the travel notes of Arab scholars and European explorers, and in the many modern books about Nile geology, Nile hydrology, Nile dams and Nile politics. The present bibliography demonstrates the enormous scope and the usefulness of this literature and of the research that has been carried out in the past. Different libraries and different web sites may have good collections of Nile studies, but most often they have both systematic and non-systematic biases; only certain disciplines, fields or historic periods are covered. Therefore, in order to help deepen our understanding of present developments and to optimise future planning of what is increasingly regarded as a scarce and vital resource, it is

thought useful to present a more complete, all-inclusive overview of literature on the river's physical character and the varying political, economic, social and cultural roles it plays for a number of societies. Such a broad bibliography may help overcome some unhelpful perspectives that have been nurtured by narrower national, social or disciplinary concerns, and by neglect of past experiences.

Today the importance of the River Nile is more evident than ever, and the way it is used and managed is the subject of heated debates among citizens and political leaders in the entire Nile basin and beyond. Millions upon millions look to the river for their drinking water, for the irrigation of crops, as a source of power, and as an object of cultural veneration and pride. Governments are preparing plans for further Nile control to secure development and growth, while both local statesmen and international institutions are searching for diplomatic solutions to avoid open conflicts about the sharing of Nile waters. If the Nile basin countries are to pursue cooperation and develop a long-term legal and institutional framework for river management, and thus reap the gains of cooperation and a more shared water vision, the dissemination of information about the river to all countries in the basin is crucial. This bibliography should ease the access to literature on the Nile and help stimulate a Nile discourse which is based on solid knowledge.

This bibliography is also thought to be of use to people interested in the general history of the Nile valley, due to the importance of the river in influencing and framing societal formations and political developments, and to people interested in the history of water in general. Some of the most ambitious water projects ever conceived by man have been planned and implemented in the Nile basin. What was for a while the biggest reservoir in the world – the Aswan Dam – came into operation in 1902. The Makwar Dam was finished in 1925 and created the biggest cotton farm in the world, the Gezira scheme. The Jonglei Canal project, first conceived at the end of the 19th century and the subject of numerous official government plans since then, aimed at digging a "new Nile" 360 kilometers long around the swamps in the Southern Sudan, yet still the plan is not implemented. The Aswan High Dam, Colonel Nasser's decisive imprint on the modern history of the Nile and the Nile valley, created the biggest man-made lake

on earth, and was supposed to turn Egypt into the Japan of the Middle East. Plans for reservoirs on Lake Tana in Ethiopia, put forward by the late Emperor Haile Selassie, have been discussed for decades by His Majesty's Government in London, American firms, Egyptian kings and the Sudan government. And finally; the dam building activities on Lake Victoria and Lake Albert in Uganda have been of great importance to the history of the whole region, from the Great Lakes Region to Egypt. Additionally, the Nile basin, the ancient birthplace of astronomy, has during the last century or so witnessed an enormous amount of research on hydrology and climate, of relevance to river basin studies in general.

In a situation where the growing water crisis in the world has become familiar to all, and international organisations have issued warnings that future wars may be fought over the issue of fresh water, a bibliography about the Nile is thought timely and relevant. Firstly because the river has an extraordinarily rich and complex history of hydropolitics and political ecology (the Nile basin was for example the first international river basin where modern states entered into agreements about the sharing of waters), and secondly; the literature shows how simple models of water sharing, alarmism and wishful thinking have been counterproductive.

The compilation of this bibliography started in the early 1980s. I was working on a Masters thesis about the history of the Jonglei Canal in Southern Sudan and became very fascinated by what I gradually understood was an epic and immensely dramatic topic. I decided that I would try to write a narrative of the history of the entire Nile basin; how it was changed by human action and how the river system has made an impact on economic, social and political developments from the 1880s. This book, *The River Nile in the Age of the British. A Case Study in Water Politics and Political Ecology on a Grand Scale*, is now finished. But as part of this work I have tried to register and annotate literature on the Nile. Parallel to the work on the Nile-bibliography I have completed another bibliography covering a certain geographical part of the Nile Valley; the south Sudan, the home of the Jonglei Canal, or the Garstin Cut, as it was called at the beginning of the 20th century. The latter book is called *An annotated bibliography on the Southern Sudan, 1850-2000*. It registers 6211 titles, out of which 3209 are

annotated, and is supposed to register all kinds of literature on the region, including literature related to the Nile issue. These three books form a whole; they represent an attempt to stimulate research and interest in what goes on in the Nile valley as well as to encourage research on man/water issues in general.

Contents

- all types of literature (books, theses, articles in scientific journals, consultancy reports and government reports). It covers everything from unpublished French and Egyptian theses on aspects of Nile development, to Egyptian and British colonial government plans for taming the river, and to obscure consultancy reports on the Fola Rapids on the Ugandan/Sudanese border and published articles on Nile cosmology and bilharzia. Only published or generally available literature is listed. Ordinary archival material and secret diplomatic documents etc. are therefore not included (for such material regarding the British era in the Nile basin, see my *The River Nile in the Age of the British*).

- literature within all scientific disciplines, from geology (the history of how the Nile was formed and when the Blue and White Nile converged, to dangers of earthquakes in the Aswan area) and geography, history (including the imperial rivalry for control of the Nile) and anthropology (including analyses of peoples' adaptations to the Nile and its fluctuations), to medicine (literature on water borne diseases) and zoology (among other things, the fascinating and dramatic history of the fish population and the Nile perch in Lake Victoria), as well as botany (for example, the literature on the spread of and battle against the water hyacinth) and hydrology (including literature on rainfall, rainfall statistics, the voluminous works on hydrology and climate published by the Egyptian government etc.).

- travel literature. The bibliography includes the extensive literature from the middle of the 19th century onwards when German, French, Italian, British, Norwegian and American travellers were searching for the sources of the Nile, and also descriptions produced by British intelligence and British officers as

they conquered the Nile valley from 1882 to 1904. This section also covers recent travel literature, such as reports on canoeing down the two Niles.

- planning- and project literature, produced both by government bodies, international agencies and consultancy firms (includes literature on among other projects the Gezira scheme in the Sudan, the Owen Falls Dam in Uganda, the Aswan High Dam in Egypt, the Jonglei project in the Sudan, Lake Tana in Ethiopia, and the Kagera basin in Tanzania).

- literature on basin wide planning, water agreements, water need assessments for sectors and countries etc. The focus of this bibliography is the River Nile as an international and transboundary river. Therefore works that bear upon upstream/downstream relations, and that deal with national and regional water assessments, sectoral water plans are included here. Works on Nile control in Egypt are included as far as they are relevant to these basin wide issues.

I have chosen eight topical categories for organising the 3488 entries: Political and Cultural History; Fisheries; Flora and Fauna; Health; Physical Characteristics; Projects and Reports; Travel and Exploration and Water Use and Water Management. The distinctions between these categories are of course not clear-cut. It is, for example, not easy to determine if an article on the sources of the Nile written by an European explorer in the 1870s should be categorized under Travel and Exploration or under Physical Characteristics, or an article on hydro-power development in the Sudan be categorised under Projects and Reports or under Water Use and Management. In order to reduce the impact of potential disagreement between my judgements and that of the reader regarding categorisation, the book includes an index of all the authors and the title of their work.

The present bibliography has benefitted from earlier bibliographical work, as those of A.H. Ali, 1977. *Agriculture in the Sudan. Selected Bibliography with Abstracts*. Khartoum, Ministry of Agriculture, Food and Natural Resources; W.J. Allan, 1962. *An annotated bibliography on climatic maps of Sudan*. Washington, U.S. Weather Bureau; Association Internationale d'Hydrologie Scientifique, 1968. *Bibliographie Hydrologique Du Bassin Du Nil*. Luvain,

Belgium, Association Internationale d'Hydrologie Scientifique; C.R. Bailey, 1985. *Water management in the Gezira Scheme, 1920- 1985 : an annotated bibliography*. Khartoum, Ford Foundation; R.O. Collins, 1991. *The Waters of the Nile: An Annotated Bibliography*. London, Melbourne, Munich, New York., University of California at Santa Barbara. Hans Zell Publishers; R.C.M. Crul; G.T. Silvestre; D.J. Postma; M.J.P. van Oijen; T.O. Acere; G. Bongers, 1995. *A bibliography of Lake Victoria (East Africa)*. SC-95/WS/16 Technical Documents in Hydrology ; IHP-IV Project M-5.1. Paris, International Hydrological Programme, United Nations Educational, Scientific and Cultural Organization (UNESCO); Yahia Hassan Hamid; Mohamed Ali Shingiti, 1977. *Bibliography of Engineering in the Sudan*. Khartoum, National Council for Research; R. Hill, 1939. *Bibliography on the Anglo-Egyptian Sudan*. London, Oxford University Press; M. Hulme, 1987. *An annotated bibliography of the climate of Sudan*. Cambridge African occasional papers / University of Cambridge. African Studies Centre. Cambridge, The Centre; M.R. Kalfatovic, 1992. *Nile notes of a howadji : a bibliography of travelers' tales from Egypt, from the earliest time to 1918*. Metuchen, N.J., Scarecrow Press; J. Oliver, 1965. Bibliography on the climate of the Sudan. *Sudan Notes and Records* 46: 127-129; H. von Schotter, 1915. Zur Bibliographie des Sudan. In W. Braumüller (ed.): *Tagebuchblätter einer Jagdreise Weiland des prinzon Georg Wilhelm ... von Khartoum und der oberen Nil*, 390-412. Vienna. I found many of the registered titles first in these bibliographies, but the aim has been to see all books, papers and reports that are entered, or, when this has not been possible, to check the entries against different bibliographical sources. What Nile scholars should do next is to organise the compilation of a bibliography of literature on the Nile written in Amharic, Arabic and other regional and local languages, and a multi-volume bibliography covering all literature on the Nile in Egypt (since the present bibliography has restricted itself to literature on the Nile in Egypt that is considered most relevant in a basin wide perspective).

Acknowledgements

Most of the titles I have registered and annotated are the product of my work in different archives, libraries and literature collections: The Public Records Office, London; National Records Office, Khartoum; Sudan Archive, Durham, England; World Bank, Washington; UNDP and UNICEF, New York; Library, UN-building, New York; FAO library, Rome; the American University in Cairo Library, Cairo; the Central Library, Cairo University, Cairo; National Archives and Library, Addis Ababa; The East Africana Collection, Nairobi; the University Library, University of Khartoum; the University of Juba Library, Juba; Library, Scandinavian Institute of African Affairs, Sweden; Makerere University, Main Library, Kampala; Library of Congress, Washington D.C.; Princeton University Library, Princeton; University of Bergen Library, Bergen; Main Library, Norwegian University of Science and Technology, Trondheim; Institute of Hydrology Library, Wellington; SOAS-Library, London and British Library, London.

I wish to thank a number of people for their valuable help and assistance. Nils Øyvind Offernes, Christine S. Axelsen and Kristin Holst-Paulsen have all helped with the registration of the literature and with the type-writing of the text. Dr. Anwar Osman has helped in checking the spelling and transcription of Arabic names. A number of librarians – too many to mention individually – have been of invaluable assistance. Last but not least I want to thank Dr. Kjell Hødnebø, Yusa Wawa and Eirik Øgaard for their valuable assistance.

I would also like to thank the Norwegian Research Council for partly financing this work and I am very grateful to the University of Bergen for supporting a study like this financially and for allowing me to carry out this time-consuming task over all these years. This support has been given in the hope that the bibliography – by providing an overview of what has been written on this great multinational river – may help stimulate further research and stronger research cooperation among researchers from different disciplines and different countries.

Terje Tvedt

Bergen 15.5.2000

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A.P. Achieng, 1990. The impact of the introduction of Nile perch, *Lates niloticus* (L) on the fisheries of Lake Victoria. *Journal of Fish Biology* 37: 17-23.

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The distribution and abundance of fish in Jebel Aulia reservoir were investigated over a period of one year. The major part of the catch was obtained from the middle region of the reservoir, i.e. Dobasi, Kawa and Kosti stations, which together contributed more than 52 percent of the total catch. The northern part of the reservoir was the least productive (i.e. Giteina and Jebel Aulia stations).

M.E.T. Ali, 1984. Fishes and fisheries of Lake Nubia, Sudan. *Hydrobiologia* 110: 305-314.

R.G. Bailey, 1989. An appraisal of the fisheries of the Sudd wetlands, River Nile, southern Sudan. *Aquaculture and Fisheries Management* 20 (1): 79-89.

The author, working at the Biosphere Sciences Division, King's College London, reports on a survey of fisheries in the Sudd carried out between 1980 and 1983. Data were obtained by observation and measurements during visits throughout the study area, except the Zeraf region, and by experimental gill-net fishing. Gives information on both fresh and processed fish which were identified and weighed. The distribution and numbers of canoes were obtained from counts incorporated into aerial surveys carried out for Mefit-Babtie study. Argues that fishery resources were under exploited but that an expansion of the commercial sector was hampered by local constraints, and that unless the natural river discharges revert to pre-1961 levels, construction of the Jonglei Canal was not a threat to fishery resources.

J.D. Balarin, 1988. *National reviews for aquaculture in Africa. 17. The Sudan.* FAO Fisheries Circular. 770.17. Rome, FAO. 120 pp.

A broad overview of aquaculture potential in the Sudan, including the South and the Sudd area.

J.S. Balirwa, 1992. The evolution of the fishery of *Oreochromis niloticus* (Pisces, Cichlidae) in Lake Victoria. *Hydrobiologia* 232 (1): 85-89.

Assesses the changes in the Lake Victoria ecosystem associated with fishing levels, rise in lake level in the 1960s, fish introductions, and human activities in the drainage basin. Argues in favour of studies on the characteristics of *O. niloticus* in Lake Victoria.

G.K. Bassa, 1982. Conservation and management of fisheries of the Sudd. In United Nations Development Programme/Food and Agricultural Organization of the United Nations (ed.): *The Sudan: the Sudd fisheries: potential and prospects: report of the seminar in Juba, the Sudan, 24-28 November 1981.* Rome, FAO.

Seminar paper. Calls for the establishment of both long term and short term research programmes for the Sudd region. The only research carried out took place in 1964, 1977 and 1978 and was in each case only short term. As a closing remark, it asks for the introduction of government controls to protect both the local fishermen and the local fish.

G.K. Bassa, 1983. Fish pond culturing farming in Western Equatoria Province - Prospectus. In *Proceedings of the second conference on research for agricultural development in the Southern Region. 5-8 April 1982*, 16-21. Juba, Regional Agricultural Research Technical Committee, Juba.

Conference paper.

G.K. Bassa, 1986. Fishery resources of Southern Sudan. In A.B. Zahlan (ed.): *The Agricultural sector of Sudan: Policy and systems studies*, 291-299. London (UK), Ithaca Press.

Discusses the gap between an estimated fish production potential of 140,000-150,000 t per annum and estimated yearly production of only 12,000-18,000 t. The production rate is partly attributed to limited government intervention and marketing constraints such as problems related to transport, storage and processing. Other aspects discussed include research, fish farming techniques and the Fish Culture Project in the Eastern and Western Equatoria provinces.

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R. J. H. Beverton, 1959. *Report on the state of the Lake Victoria fisheries*. [Lowestoft, Eng.], Fisheries Laboratory.

G. Bini, 1940. I pesci del Lago Tana. In G. Brunelli; F. Cannicci (eds.): *Le caratteristiche biologiche del Lago Tana. Missione di Studio al Lago Tana*, Vol.3. Part.2. Rome, Real Acad. d'Ital.

H.M. Bishai, 1963. *Fish farming in Equatoria Province*. Special publication - University of Khartoum, Hydrobiological Research Unit. Khartoum, Univ. of Khartoum. 38 pp.

Investigations carried out during the 'Upper Nile Expedition' in 1960. Eleven ponds were inspected, the various fish species studied and the biological and chemical characteristics of the water in the ponds were determined. The aim of the study was to provide information for improved construction and management of such ponds, both barrage ponds and diversion ponds. It concluded that the yields up to the time of writing were poor and that management must be improved for this type of fish farming to be profitable. Fertilization was strongly recommended.

Abdal-Wahab Branhi, 1973. The Fish Wealth of Lake Nasser and the Social Aspects of its Exploitation. *Al-Tali'a* 9 (3; March): 45-51.

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Committee for Inland Fisheries of Africa, 1990. *Report of the 5th session of the Sub-Committee for the development and management of the fisheries of Lake Victoria. Mwanza, Tanzania, 1989*. FAO Fisheries Report; no. 430. ISBN 925102961X, Food and Agriculture Organization of the United Nations. 100 pp.

Committee for Inland Fisheries of Africa, 1992. *Report of the sixth session of the Sub-committee for the Development and Management of the Fisheries of Lake Victoria : Jinja, Uganda 10-13 February 1992*. FAO fisheries report; no. 475. ISBN 9251032297. Rome, Food and Agriculture Organization of the United Nations.

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Committee for Inland Fisheries of Africa, 1995. *Current status of fisheries and fish stocks of the four largest African reservoirs. Kainji, Kariba, Nasser/Nubia and Volta*. CIFA Technical Papers 30. Job no. V6455/E. ISBN 9251036837, Food and Agriculture Organization of the United Nations. 141 pp.

M.-C. Comte, 1982. The riddle of Lake Victoria : how much fishing, how many fishermen? *Ceres* 88 (15:4): 33-37.

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F.A.R. el-Higzi; S.A. Haider; P. Larsson, 1995. Interactions between Nile tilapia (*Oreochromis niloticus*) and Cladocerans in Ponds (Khartoum, Sudan). *Hydrobiologia* 307 (1-3): 263-272.

Mohammed Osman el-Sammani, 1984. Private Sector and Government Commercial Fishing in the Sudd area, Southern Sudan. *Economic Geography* 60 (3): 210-216.

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Argues that producers of sun-dried fish have concentrated on subsistence production, and that commercial producers monopolise the production of salt-dried fish for both regional and national markets in the early 1980s. Emphasizes that the industry was flourishing because it was regarded profitable to both fishermen and merchants. Continued growth in market demand offered opportunity for future development in capital, training and infrastructure. The author argues that investments should be developed to expand a resource use system that is intermediate in scale between artisan fisheries and industrial operations.

M. Faisal, 1986. Die natürlichen Fischressourcen Ägyptens. *Der Tropenlandwirt* 87 (10): 97-109.

Food and Agriculture Organization of the United Nations, 1972. *The Democratic Republic of the Sudan - Fisheries Training and Development. A report prepared for the FAO/United Nations Project for Youth Training Centres in the southern provinces of the DRS*. FAO/UN Sudan 46. Rome, FAO. 57 pp.

Written by E.G.R. Pike. Based on interviews and field visits in 1972, the report describes the (then) existing fishing industry, technology, markets, and proposes a series of improvements and detailed recommendations on training centres, technical assistance and marketing measures.

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Written by E.G.R. Pike. Based on his earlier report for FAO (1972), this report proposes a plan for assistance to the Fisheries Department in the Southern Regional government: fishing training centre in Malakal, establishment of cooperatives, technical assistance (nets, tackle, boats), marketing, transport and a credit scheme. The Fishery dept. was recommended to strengthen its staff and services.

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Food and Agriculture Organization of the United Nations, 1982. *Report to the government of Sudan on boatbuilding activities at the regional fisheries training centre, Malakal, the Sudan*. FAO/GCP/SUD/019/DEN. Fiche no. 8225869-E. Rome, FAO.

Written by J.F.B. Shaw.

Food and Agriculture Organization of the United Nations, 1982. *Sudan. Fish marketing and processing. A report prepared for the Sudd Fisheries Development Programme*. FAO-FI--DP/SUD/79/001 FAO Acc.No. XF8224935. Rome, FAO. 79 pp.

Field document 1. Based on the work of C.R.C. Carleton and M.S. Pena. Report of a mission to the Southern Sudan in 1982, led by C.R.C. Carleton and M.S. Pena. Fishing described as being closely related to and part of rural economy and social institutions. A general improvement of rural economy would help the development of fishery and vice versa. Transport and marketing, as well as fish processing procedures should be improved, but local management and control must be secured.

Food and Agriculture Organization of the United Nations, Fisheries Department, 1982. *The Sudan. The Sudd Fisheries: Potential and Prospects. Regional Seminar on the Sudd Fisheries, Potential and Prospects, Juba, November 1982*. The Sudan. The Sudd Fisheries: Potential and Prospects. Regional Seminar on the Sudd Fisheries, Potential and Prospects, Juba, November 1982. Rome, FAO. 79 pp.

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Written by K. Fremstad.

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BIBLIOGRAPHY ON THE RIVER NILE

A report requested by the Sudan Government on inland fisheries in the Sudan. Brings together findings of two missions, one of which visited the country in April 1975 and another in February/March 1976. Deals mainly with the five reservoirs on the Blue and White Niles covering a total area of 3,000 km², while the swamp areas are usually said to cover 17,000 km². The estimated 22,000 tons of fish is divided equally between the two. The Southern fisheries are described as the remaining source of additional fish, but the report identifies problems of urbanization, transport etc.

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This vol. 2 of the FAO/World Bank report presents annexes 8-19, with maps and drawings. Deals with fisheries in Jebel Aulia Reservoir, Roseiris reservoir fisheries, Lake Nubia and Southern Region Fisheries. Presents also drawings of different types of boats (flat-bottom boats for the Southern Region) and organization charts.

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The study was conducted for about six weeks between March and April 1981. The area of study was specified as the 17,000 km long Sudd region which falls between Bahr-el-Ghazal, Bahr-el-Zeraf and Bahr-el-Jebel rivers. Recommends the establishment of marketing societies, and training of members in cooperative societies and health programmes. Contains nine appendices including the Southern Sudan's approved policy for development of cooperatives (Jan. 1980).

T. Stroemme, 1985. *Fisheries resource survey of the Nile Delta, Egypt, 12-17 Dec 1984* Field Document. FAO-FI--GLO/82/001. Bergen (Norway). 8 pp.

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Sudan. Bahr-el-Ghazal Region. *Fish resource development project*. Wau, Ministry of Agriculture and Animal Production; Bahr-el-Ghazal Region. 3 pp.

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A report on the implementation of the UN project on Sudd fisheries for the year 1982, with plans for 1983, prepared by K. Fremstad. The lack of fuel was considered a major problem, stopping almost all activities. Plans for fish marketing and extension work.

United Nations Development Programme, 1983. *Sudd fisheries development programme: project revision 1*. F1:DP/SUD/79/001. New York (Khartoum), (UNDP). 19 pp.

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Special attention is paid to the variability of both the annual and monthly rainfall over Sudan. The percentage probability of receiving below or above certain amounts of rainfall is of great significance to the farmer and is hence determined here. The study is concluded by a statistical analysis (multiple regression) of the relationships between the mean rainfall and four climatic factors which appear to be important contributors to rainfall over Sudan. Sixty-six stations are used in the study, mean values being those for the 1931-60 reference period.

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The paper analyses statistically the relationships between annual and monthly rainfall and four likely determined factors: the location of the ITCZ, relief, monsoonal dominance and line-squalls. These are selected because it is believed that the rainfall over Sudan is associated with the movements of the ITCZ and the monsoonal winds, the effects of which are influenced by relief. Line-squalls also seem to play an important part in the distribution of rainfall especially in the central parts of the country. Multiple regression is applied to data from 15 representative stations to establish the degree of importance of these four factors. Latitude (i.e. ITCZ) is found to be the most important single factor, with the August regression model presenting the highest degree of explanation. An additional factor of possible importance not investigated is surface temperature, especially where convectional rainfall predominates.

Mahdi Amin el-Tom, 1971. *A contribution to the precipitation climatology of the Sudan*. PhD thesis, Sheffield University. 335 pp.

The thesis investigates the annual, monthly and pentadal rainfall distribution over Sudan, using 65 stations and statistics from the period 1931-60. The resulting distributions are described and anomalies, such as the apparent dryness of the Sudd, explained. There is some extensive discussion on measures of rainfall variability most appropriate for such a climatic regime. The thesis forms the basis of the author's later book.

Mahdi Amin el-Tom, 1972. The reliability of rainfall over the Sudan. *Geografiska Annaler (A)* 54: 28-31.

The paper attempts to throw some light on the variability and reliability of rainfall over the Sudan. Twenty stations are used to calculate the standard deviations and the coefficients of variation. The latter index gives a more realistic impression of the rainfall variability. Also, an attempt is made to measure the reliability of rainfall as a means for determining the extent and reliability of rain-cultivation in the country. The magnitude of the risk involved in the transitional areas is indicated by the percentage probability of receiving critical rainfall values.

Mahdi Amin el-Tom, 1972. Towards a rational estimation of the average rainfall in the Sudan. *Sudan Notes and Records* 53: 125-153.

Regression analysis is employed to define a model determining mean pentad rainfall over Sudan. The model is constructed using 1931-60 pentad means incorporated (latitude, distance from the southwest border and distance from the eastern border) with a fourth later being added (mean daily maximum temperature) to represent convective processes. Residuals are improved by sub-dividing the country into three zones (8.5 and 17 degrees N being the boundaries) and constructing three separate regression models. The result of these models are presented in the paper through the 16 maps which accompany it. Mean pentad rainfall can be estimated for any location in Sudan within small, known error margins.

Mahdi Amin el-Tom, 1973. A harmonic analysis of the rainfall over the Sudan. *Journal of Tropical Geography* 37: 9-15.

Harmonic analysis is employed to investigate the temporal pattern of precipitation over the Sudan. Analysis uses 19 stations from throughout Sudan based on mean pentad rainfalls for the period 1931-60. The analysis was carried to the 6th harmonic, with the first three accounting for between 75% and 98% of the variation in precipitation over Sudan. The predominance of the 1st harmonic (80% over southwestern Sudan) reflects the marked bi-seasonal nature of Sudan rainfall. The results of the harmonic analysis may be used to assist in the regionalisation of precipitation regimes over Sudan.

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The book is organised in three main sections; i) the process of precipitation which is general in nature and not related directly to Sudan; ii) the mechanisms of precipitation in Sudan; iii) the distribution of precipitation in Sudan. This latter section looks at annual, monthly and seasonal distributions with the aid of 40 pages of rainfall distribution maps. It is assumed the data are from 1921-50, although this is nowhere specified. Neither is there given any indication of the station density used to construct the diagrams.

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B. Entz, 1976. Lake Nasser and Lake Nubia. In J. Rzoska (ed.): *The Nile: Biology of an Ancient River*. The Hague, Dr. W. Junk.

B. Entz, 1977. *Sedimentation Process Above the Aswan High Dam in Lake Nasser-Nubia (Egypt-Sudan)*. International Vereinigung fur Theoretische und Angewandte Limnologie, Denmark. 1667-1671 pp.

Argues that if sedimentation continues undisturbed, Lake Nasser would not be completely filled for 1700 years. Strong water level fluctuations and floods could markedly reduce filling time.

T. Evans, 1990. History of Nile Flows. In P.P. Howell; J.A. Allen (eds.): *The Nile. Resource Evaluation, Resource Management, Hydropolitics and Legal Issues*, 5-40. Royal Geographical Society; School of Oriental and African Studies; University of London, London, SOAS/RGS.

Presents the history of Nile flows, with particular attention given to Roda Nilometer (620-1920 AD). More recent records of the White and Blue Niles are analysed, and recommends that these two catchments should be treated independently. Argues that the Nile flow was exceptionally low in the 20th century.

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Argues that the water budget of Lake Victoria is decisively influenced by the nocturnal land-breeze, which is associated with lake surface temperatures about 3.50C higher than air temperature. Model computations suggest that about half of the annual precipitation is due to this circulation. A possible mechanism for the rapid increase in lake level, and thus in the White Nile runoff, which occurred after the anomalous rainy season 1961/62, and which had devastating effects along the Bahr al-Jabal and Bahr el-Zaraf in the Southern Sudan in the early 1960s, is discussed. Runoff data for the Nile at Aswan (1889-1928) indicate that the low values during spring (February-May) are significantly correlated, at the 1% level, with the fluctuations of Lake Victoria 6 months before. This allows a tentative reconstruction of lake levels since 1870 to be made and hence a general estimate of flood conditions in the central Southern Sudan back to 1870. Nile runoff values are also correlated with the Ethiopian summer rainfall 8 months before.

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W. Garstin; H.G. Lyons, 1905. The White Nile: Lake No to Gondokoro. In A.E.W. Gleichen (ed.): *The Anglo-Egyptian Sudan*, 1. London.

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W. Garstin; M. Peake, 1905. South-western Sudan: Itinerary of the Bahr el Ghazal river: Lake No to Meshra el Rek. In L.-C.A.E.W.c. Gleichen (ed.): *The Anglo-Egyptian Sudan. Vol. 1*. London.

Sir William Edmund Garstin was a British engineer born in India who was appointed inspector-general of irrigation for the Egyptian Government in 1892 and shortly afterwards became under-secretary of state in the Egyptian Ministry of Public Works.

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J. G. Grijnsen, 1993. *An information system for flood early warning*. Publication, no. 479 0166-7521 ; Publication (Waterloopkundig Laboratorium (Delft, Netherlands)) ; no. 479. [Delft, Netherlands], Delft Hydraulics Laboratory.

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To study the contribution of various daily rainfall amounts to the total annual rainfall in Sudan, 24 stations were randomly selected from those available in 1961. The results produce a negative exponential curve of cumulative percentage of rain days against cumulative contribution to annual rainfall total. 15% of rain days produced 46% of total rainfall and 32% of days produced 72% of total rain. These results accord well with those from other tropical regions. A slight regional difference was detected indicating that a smaller number of dynamically induced rainfalls and a greater number of orographically-developed random convectional rainfalls may occur in southern Sudan.

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Major episodes of low Nile discharge have been noted for the periods between the years 930 and 1070, and between 1180 to 1350. Major episodes of high Nile floods occurred from 1070 to 1180 and from 1350 to 1470. The article asserts that short-term fluctuations in Nile flood maxima appear to reflect variations in the contributions from the White Nile, and to variations in water levels of Lake Chad. The author concludes that the episodic variations in Nile flood discharge are probably the result of climatic changes that influence precipitation in equatorial Africa. Argues that comparison of data on Nile flood stages, indicates that there is a correlation between low Nile discharge and cold climate in Europe.

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Presents a range of climate scenarios "specifying the likely magnitudes and rates of change in Nile Basin precipitation over the next few decades" (constructed from historical analogues, recent instrumental data and General Circulation Model experiments). Argues that climatic factors will demand greater flexibility in Nile Basin water management.

M. Hulme, 1984. 1983: an exceptionally dry year in central Sudan. *Weather* 39: 281-285.

Annual and monthly rainfalls for 1983 are presented and placed in the context of the 20th century rainfall record. Between 14 and 16 degrees north 1983 was the driest year this century resulting in widespread crop failure. Famine was already being reported in January 1984 in Darfur Province.

M. Hulme, 1985. *Secular climatic and hydrological change in central Sudan*. PhD thesis, University of Wales. 282 pp.

Unpublished PhD thesis. Changes in 20th century rainfall characteristics in the 12 to 16°N zone of Sudan are investigated at two levels. First, up to 55 annual rainfall series are analysed with respect to climatic change. Secondly, 12 long-term series of daily rainfalls are analysed with respect to changes in daily rainfall magnitude-frequencies and wet season structures. The hydrological response to such rainfall changes is explored in the context of a local study area in the White Nile Province. Experimental, interview and limited archival material is used to examine several hydrological variables, including infiltration capacities, wadi flow magnitude-frequencies, groundwater aquifers and water quality.

M. Hulme, 1987. Rainfall in central Sudan : an asset or a liability? *Geoforum* 18.

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M. Hulme; A. Trilsbach, 1986. Rainfall trends and rural changes in Sudan since Nimeire: some thoughts on the relationship between changes and political control. In P. Woodward (ed.): *Sudan since Nimeiri*, 3-18. London, SOAS.

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The section of the Survey Department responsible for collecting rainfall statistics, daily river gauge readings and publish annual reports on these subjects was transferred to the Ministry of Public Works in 1915 as the Physical Department. This report instead of publishing all the data for the lacking years gave five-day man readings for what was regarded as presentative gauges between Lake Victoria and the Delta Barrage. This was the Hurst paper (he now was Controller in the Physical Department) which gave MacDonald scientific support against the criticism from Willcocks and Craig. The readings are based on 20 gauges (one on Bahr al-Jabal, one at Entebbe, and one at Butiaba, and none in Ethiopia).

H.E. Hurst, 1923. *The rains of the Nile Basin and the Nile flood of 1913*. Ministry of Public Works, Physical Department. Physical Department Paper No. 12. Cairo. 98 pp.

The Contents includes chapters on: the normal distribution of rainfall and the rainfall of 1913; the low stage preceding the Nile flood and the flood of 1913, along with a summary of the 1912 flood and the low stage of 1913; and finally, tables of rainfall and river gauge readings which comprise most of the report.

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H.E. Hurst, 1927. The hydrology of the Nile. *Geographical Journal* 70.

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Based on a journey undertaken by the author in 1926. The route and mode of travel are described in the introduction to this report about the Upper White Nile basin. A study of the Lake Victoria basin, especially the Kagera River with its tributaries. Concluded that the contribution of this part of the basin to the water supply of the Nile was not large enough to justify a detailed study. 66 pages.

H.E. Hurst, 1928. *Progress in the study of the hydrology of the Nile in the last twenty years*.

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H.E. Hurst, 1963. *The Nile Basin. Third supplement to Volume III: Ten-day mean and Monthly mean Gauge readings of the Nile and its tributaries 1938-42 and normals for the period 1912-1942*.

H.E. Hurst, 1966. *The Nile Basin. Volume X: The Major Nile projects*. United Arab Republic, Ministry of Irrigation. Paper No. 23. Cairo, General Organisation for Government Printing Offices. 253 pp.

This contains a reappraisal of the situation after the Jonglei Investigation Team's criticism of their plan as suggested in Vol. VII, and after the East African countries had demanded Nile waters and after the Sadd al-Aali became the Egyptian project of priority. The authors argue that the theory of Over-Year storage as developed in Vol. VII had been confirmed, and should be used as a basis for the new Sadd al-Aali scheme.

H.E. Hurst; R.P. Black, 1938. *The Nile Basin: Volume VI. Monthly and annual rainfall totals and number of rainy days at stations in and near the Nile Basin for the period ending 1937*. Cairo, Ministry of Public Works, Physical Department. 613 pp.

Isohyetal maps of annual rainfall in the Nile Basin at 100mm intervals and tabulated rainfall data are included. Northeast Africa and east central Africa is covered. [Supplements 1 and 2 provide additional data for up to 1943 and 1950 respectively; Papers Nos. 43 and 49.]

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H.E. Hurst; R.P. Black, 1946. *The Nile Basin. Third supplement to Volume III: Ten-day Mean and Monthly Mean Gauge Readings of the Nile and its Tributaries for the years 1938-1942 and Normals for the period 1912-1942.* Ministry of Public Works, Egypt, Physical Department. Physical Department Paper No. 47. Cairo, Whitehead Morris Press. 388 pp.

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H.E. Hurst; R.P. Black, 1955. *Report on a hydrological investigation on how the maximum volume of the Nile water may be made available for development in Egypt and the Sudan.*

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H.E. Hurst; R.P. Black; Y.M. Simaika, 1959. *The Nile Basin, Volume IX: The hydrology of the Blue Nile and Atbara and of the Main Nile to Aswan, with some reference to projects.* United Arab Republic, Ministry of Public Works, Egypt, Nile Control Department. Paper, no. 12. Cairo, General Organisation for Government Printing Offices.

The two first authors were now scientific consultants to the Egyptian government, while Simaika was a technical consultant. This report was of 206 pages, summarizing hydrological research about the Blue Nile with some comments on the Sadd el-Aali project.

H.E. Hurst; P. Phillips, 1931. *The Nile Basin. Volume I. General description of the Basin, Meteorology, Topography of the White Nile Basin.* Physical Department Paper. 26. Cairo, Government Printing Press. 144 pp.

Gives a detailed, though broad outline of meteorology and topography in the White Nile Basin. Contains a 20 page bibliography covering topography, hydrology, vegetation and general matters relating to the Nile Basin. Chapter V deals with the Bahr al-Jabal, Bahr al-Zaraf and Sudd Region (pp. 74-82) and chapter VI describes the Bahr al Ghazal basin (pp. 82-104) and chapter VII deals with the White Nile.

H.E. Hurst; P. Phillips, 1933. *The Nile Basin. Supplement to Volume IV: Ten-Day mean and monthly mean discharges of the Nile for the years 1928 to 1932 and normals for the period 1912-1932.* Ministry of Public Works, Egypt, Physical Department. Physical Department Paper No. 31. Cairo, Government Press. 259 pp.

Extends the information contained in vol. IV up to the end of 1932.

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Discharges are given for all years for which records were available. The northernmost station is at Cairo and ends at Nimule on the White Nile and at Lake Tana exit on the Blue Nile.

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H.E. Hurst; P. Phillips, 1938. *The Nile Basin. Volume V. The Hydrology of the Lake Plateau and the Bahr el Jebel*. Ministry of Public Works, Egypt, Physical Department. Physical Department Paper No. 35. Cairo, Schindlers Press.

A 251 page report on the hydrology of the Lake Plateau and the Bahr al-Jabal, summarizing the research carried out by the Physical Department, until World War II.

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H.E. Hurst; Y.M. Simaika; R.P. Black, 1949. *The Nile Basin. Third supplement to Volume III: Measured discharges of the Nile and its tributaries in the period 1938-1942*. Ministry of Public Works, Egypt, Physical Department. Physical Department Paper No. 46. Cairo, Government Press. 216 pp.

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H.E. Hurst; Y.M. Simaika; R.P. Black, 1950. *The Nile Basin. Volume VIII: The Hydrology of the Sobat and White Nile and the Topography of the Blue Nile and Atbara*. Ministry of Public Works, Egypt, Physical Department. Physical Department Paper No. 55. Cairo, Government Press. 141 pp.

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H.E. Hurst; Y.M. Simaika; R.P. Black, 1953. *The Nile Basin. Fourth supplement to Volume IV: Ten-day mean and monthly mean discharges of the Nile and its tributaries for the years 1943-1947 and Normals for the period 1912-1947*. Nile Control Department Paper No. 2. Cairo, Government Press. 347 pp.

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Vol. 1

Vol. 2

Annex A: The Gezira Scheme: Background, Physical Conditions and Resources.

Annex B: Agriculture (Agro-Economics).

Vol. 3

Annex C: Markets. Marketing Structure, and Prices.

Annex D: The Tenant and Agricultural Labour.

Vol. 4

Annex E: Irrigation and Drainage (Field Water Management).

Annex F: Cotton Ginning Facilities.

Vol. 5

Annex G: Infrastructure.

Annex H: Housing, Utilities and Health.

Annex I: Workshops and Maintenance Facilities.

Vol. 6

Annex J: Organization and Management.

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Collaborator: Sir Alexander Gibb and Partners. Technical Consultation Services. (From: SSA).

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Lists the pros and contras of the Aswan Dam as seen from an Egyptian point of view. According to the author these include on the positive side: (1) more and sufficient water supply for agricultural and industrial growth, (2) doubling of electric power output, (3) improved fishery in Lake Nasser, (4) high and low flood protection, (5) improved navigation, and (6) increased tourism. Negative effects: (1) inundation of vast areas of land requiring relocation of 50,000 people (sic!) and several historical monuments; (2) a change from a riverine to a lacustrine system; (3) regulation of the once variable water flow, with reduction of flow to the Mediterranean with increased river bed and bank erosion; (5) evaporation from the reservoir of about 10bm³ annually; (6) change of shoreline ecology; (7) alteration of river morphology, water quality, and ecology, including excessive plant growth; (8) an increase in schistomiasis; and other water-born diseases.

Hafslund Consulting Division, 1981. *Eastern Equatoria Hydro-electric Power Study: Feasibility Study*. Oslo. 40 pp.

Project analysis of a planned hydro-power plant at Fola Rapids in the Southern Sudan, financed and supported by the Norwegian government through the Norwegian Church Aid/Sudan Programme and the Regional Government in Juba. Appendices.

Hafslund Consulting Division, 1983. *Democratic Republic of the Sudan. Kinyeti Hydro Power Scheme. Feasibility Study 1981*. Oslo. 34 pp.

Assesses hydroelectric power potential in the Kinyeti River and the local power demand. Discusses the most attractive project sites, describes the project and its suggested implementation, outlines transmission lines etc. The 43 appendices include among other subjects local rainfall, river discharge from 1951 to 1981 and a number of drawings of the proposed Kinyeti Hydroelectric Power Scheme. Total capacity of 'Stage A includes 3 units of 1 MW each and a firm power production of 12,2, GW/year'(p.2). Kinyeti ends in the swampy area south-west of Bor.

Hafslund Consulting Division, 1984. *Democratic Republic of Sudan. Fula Rapids Power Station. Feasibility Study*. Oslo. 40 pp.

Discusses electricity supply and demand in Juba and the rest of Equatoria and presents a proposed design of a Fula Rapids project including transmission lines, project implementation, training and cost estimates. The 24 appendices include a number of tables on past, present and future energy demand and supply in the Juba area. Regards the Fula area as 'feasible for step by step development of the hydro electric power potential of the Nile between Nimule and Juba' (p.10). No discussion of basin-wide water-allocation problems. Based on a field survey in 1979 and 1981.

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Osman el-Tom Hamad; Abdalla A. Salam Ahmed; Ahmed Khalid El Daw, 1988. Impact of drought on the Gezira scheme irrigation needs. In I.M. Abdel-Magid; et al. (eds.): *Proceedings of the international conference on water resources, needs and planning in drought prone areas, part 2*, 912-955. Khartoum.

Shows that water released to Gezira Scheme from Sennar Dam during the rainy season continued to increase every year from 1981 to 1984. This was found to be a direct result of successive decrease in rainfall over the Scheme area. The two main canals conveyed their maximum discharge capacity throughout the 1984 rainy season, for the first time in their history. Despite this, they failed to satisfy the irrigation needs imposed by the drought. The factors influencing the irrigation needs were investigated.

Paper presented to the International Conference on Water Resources, Needs and Planning in Drought Prone Areas, Khartoum, Dec. 6-12, 1986. Collaborator: UNESCO, UNDP, Sudan Engineering Society and International Association for Hydraulic Research.

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This study deals with the Kenana project close to Kosti in Sudan, a project for producing sugar.

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This article was written by the first irrigation consultant to the Uganda government, and was part of Governor Hall's effort to stop the Egyptian proposal from 1946 and to forward their own: electrify Uganda with Nile power.

P. Hayes, 1977. *Jonglei Canal: Risking Social and Ecological Disaster*. Nairobi, Environment Liaison Centre.

G. Heinritz, 1978. Social geographic problems in the Khashm el Girba project, Sudan. *Land Reform, Land Settlement and Cooperatives (FAO) 2*: 25-35.

This paper studies different groups living in the Khashm el Girba Project area: the resettled Nubians, the nomads, and a farm worker group from Western Sudan and West African countries who moved to the area after project completion. Argues that the Nubians reacted with an increased engagement in non-agricultural occupations, since the nomads are not prepared to confine themselves to irrigated farming and continue to keep livestock, causing some conflicts with the project management. The later immigrants play an important role in cotton production, cultivate groundnuts under sharecropping arrangements, or work for Nubian tenants.

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This report by Dutch consultants for the Executive Organ for the Development Projects in the Jonglei Area describes the methodology of the research involving interviews with local government representatives and the rural population. Discusses problems of cattle migration, the social system of the fishing community and religion. A plea for the eastern alignment of the Jonglei Canal, being a direct line from Sobat to Bor, instead of the officially favoured modifications of the original line. The authors insist that their report reflects the view of the local population. A number of tables and figures on cattle migration routes are presented. Appendix 1-A. Data of Nyennyang cattle camp on herd structure. Appendix 1-B: Example of compensation for lost property of one Shilluk compound. Appendix 2. Map of the suggested alignment to the east of the settled areas between Bor and Duk Faiwil.

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A short version of the reports on the Jonglei Canal, written by the Team Leader of the Jonglei Investigation Team. See Jonglei Investigation Team.

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P.P. Howell, 1983. The impact of the Jonglei Canal in the Sudan. *Geographical Journal* 149 (3): 286-300.

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P.P. Howell; M. Loch; S. Cobb, eds., 1988. *The Jonglei Canal. Impact and opportunity*. Cambridge, Cambridge University Press. 537 pp.

Aims at describing the background and the plans for the Jonglei Canal and their implementation, and the local and regional impact of the canal. Fourteen authors contribute to this study, representing hydrology, zoology, botany, ecology, marine biology, agronomy, history, anthropology and political science. The book consists of 6 parts; the historical and international aspects of Nile control, the hydrology of the White Nile and her sources and its impact on the Sudd region, the history of human adaptations in the Jonglei area, local exploitation of natural resources, possible local effects of the canal, and past experiences and future needs of rural development. The book presents a summary of the acquired knowledge of the region.

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The British Director-General of the Physical Department describes here the projects and plans on the Upper Nile in an 'Egyptian perspective', taking as a starting point that the 'political changes in Abyssinia (the Italian invasion, my comment) have brought the question of the Nile into prominence' (p. 173).

H.E. Hurst, 1948. Major Irrigation Projects on the Nile. *Civil Engineering and Public Works Review* 43 (507): 450-452.

A short description of the projects which were being discussed in the technical negotiations between Egypt, Sudan and Uganda in the late 1940s, and an attempt to show how they formed a part of a 'scheme for the full development of irrigation from the Nile'. Argues that the sudd canal will 'have a very great effect on the Sudd region and its inhabitants, especially as the effect of regulation will be to inter-change seasons' (p. 452), but that on balance the canal and reservoir in Lake Albert will be of great benefit to the riparians.

H.E. Hurst; R.P. Black; Y.M. Simaika, 1946. *The Nile Basin, Volume VII. The Future Conservation of the Nile*. Ministry of Public Works, Physical Department. Physical Department Paper No. 51. Cairo, S.O.P. Press. 178 pp.

The published plan of the Egyptian Ministry of Public Works. According to the then Minister of Public Works Abdel Kawi Ahmed, it was 'the first time that the full development of Egypt ..(was)...considered in detail and a new idea, that of 'Century Storage' (...) introduced. Hurst was Director General, Physical Department, Black was Technical Deputy Director General. Physical Department, and Simaika was Director Hydrological Service, Physical Department. The authors stated that the book did not "pretend to be the last word on Nile projects, since many features of the final stage can only be settled after earlier stages are working, but it does give the general lines on which development must proceed which are fixed by the hydrology of the Nile" (p. xiv).

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A.M. Ibrahim, 1981. *The environmental impact of the Jonglei Canal Project in the Sudan*, Khartoum. Institute of African and Asian Studies; University of Khartoum. 15 pp.

A description of the canal project by one of its defenders, the head of the Projects Implementation Division AAAID, and formerly Commissioner of the Executive Organ for the Development Projects in the Jonglei Area. Argues that the design of the canal scheme as drawn up in the early 1980s would not affect the sudd owing to the reduction in its capacity. By diverting only 20 million m³/day no detrimental effects would be felt locally. On the contrary, the project hoped to improve the way of life of the Nilotics through the construction of roads, improved cattle breeding, fishing and other modern innovations. Also published in *The Nile Valley countries: continuity and change*/ed. M.O. Beshir; Khartoum, 1984. pp.18-30.

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The project objective was to improve crop production in the irrigated subsector through improvements in research, extension and training. Over a 6-year period, the project should strengthen the technological base required for higher production, reform the subsector extension system, and upgrade the skills of field personnel. The project would (a) rehabilitate and strengthen agricultural research at five regional stations in the irrigation areas; (b) upgrade the skills of field inspectors and establish programmed extension services at New Halfa and Rahad Corporations; (c) strengthen the National Extension Administration; and (d) strengthen the in-service training capabilities of the University of Gezira.

World Bank, 1985. *Power rehabilitation project - Sudan.*

The project aimed at helping to ensure the efficient utilization of existing power facilities, improve power supply reliability, and assist in the financing of urgently needed additions of capacities and urgently required rehabilitation works to meet the growing power demand at least cost to the economy. The project would contribute to institution building and strengthening of power subsector organization, establishment of long-term development policy, tariff reforms, load management and energy conservation, and subregional power system interconnections. The project included: (a) addition of 2 x 10 MW diesel units at Burri; (b) rehabilitation of units 1 and 2 at Roseires hydropower station; (c) spare parts for the Sennar hydropower station; (d) rehabilitation of the Blue Nile and the Eastern Grid installations; and (e) consultancy services for supervision of project implementation and coordination of management improvement, and the carrying out of studies and feasibility reports.

World Bank, 1986. *Northern province irrigation rehabilitation projects - Sudan (IFAD project).*

The project aimed at increasing the food production capacity and farm incomes of the smallholder farmers in the Northern Agricultural Production Corporation (NAPC) schemes, thus contributing to a food supply stabilization in the Northern Province. Complementing previous IFAD support to agricultural development, the project comprised several components including the (a) rehabilitation of five NAPC irrigation schemes covering about 19,000 feddans and establishment of a new scheme of about 2,500 feddans area at Affad. In addition, the project entailed (b) provision of extension services, short-term input credit, medium-term agricultural implements credit, plant protection services, and support to a programme for orchard trees and facilities for livestock. Further to this, the project also provides (c) support to the desert encroachment programme; (d) funds to strengthen women's extension activities; and (e) institutional development strengthening through recruitment of qualified consultants, staff training and improvement of facilities.

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World Food Program, 1969. *WFP assistance to three land settlement projects at Khashm el Girba in the Sudan - Interim evaluation / Aide du PAM pour trois projets de colonisation agraire à Khashm el Girba au Soudan - Rapport provisoire d'évaluation / Prestacion de ayuda del PMA a tres proyectos de colonizacion de tierras en Khashm el Girba, Sudan - Evaluacion provisional*. Intergovernmental Committee Of The World Food Program /Sixteenth Session/, Rome, 13-18 Oct 1969. FAO. 12 pp.

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H.A. Bernatzik, 1943. *Zwischen weissem Nil und Kongo. Ethnographische Bilddokumente einiger Völker am oberen Nil*. Wien, Anton Schroll. 208 pp.

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H.A. Bernatzik, 1948. *Gari-Gari. Leben und Abenteuer bei den Negern am Oberen Nil*. Innsbruck, Schlüsselverlag Ges. M.B.H. 198 pp.

A reprint of the book with almost the same title from 1930, extended with more pictures and stories.

C.H.F. Bialloblotzky, 1848. *Journey to discover the sources of the Nile. Letter to Dr. Beke*. London.

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Selim Bimbachi's diary from the voyage to discover the Nile sources, sent by Mohammed Ali in 1839-42, in three successive journeys, accompanied by 400 soldiers. The present French translation presents the last of these journeys, where they reached the Bari country and returned at Rejaf. Captain Selim was accompanied by a French engineer, Arnaud, who in 1843 sent further notes and a map to this journal.

J.N. Blashford Snell, 1970. Conquest of the Blue Nile. *Geographical Journal* 136: 42-60.

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B. Brander, 1966. *The River Nile*. Washington, National Geographic Society. 208 pp.

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An editorial note summing up the latest discoveries and travels in the upper Nile basin and the area of the Equatorial lakes. Some paragraphs from the diary of Romolo Gessi, 1874 and 1875 are published in the review.

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An account of the author's travels in the Upper Nile region. Reference to his travels in the 1830s and 40s. Strongly recommends improving communications and trade, which, according to the author, have a promising future in the region. Antoine Brun-Rollet arrived in the Sudan in 1831 as an employee of J.M.F. Vaissiere. In 1845 he travelled up the White Nile to the Bari country. He founded a trading post in the Kich country. He was the first European to explore the Bahr al-Ghazal river in 1856-57.

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S.M. Burstein, 1976. Alexander, Callisthenes, and the Sources of the Nile. *Greek, Roman and Byzantine Studies* 17 (2): 135-146.

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Captain Gaetano Casati worked for L'Esploratore, a Milanese geographical journal, but at the request of Romelo Gessi Pasha, then governor of the Bahr al-Ghazal, he arrived in the Bahr al-Ghazal area before returning with Emin Pasha and H.M. Stanley to the East African Coast in 1891, that is, the so-called Emin Pasha Rescue Operation.

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Written in the spirit of Ismail Pasha, who is quoted as saying: 'Africa is now the last portion of the civilized world which awaits at the hand of Europeans the salutary yoke of legislation and culture (p. vi). Gives descriptions of physical features and daily-life situations among Bari and Zande people. Illustrated. A French edition was published in 1877. The title was: 'Voyage au lac Victoria Nyanza et au pays Niam-Niam'.

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A biography of Don Angelo Vinco, a Catholic Missionary from Verona, 1819-53. Includes a vita and his writings from the mission in Sudan, i.e. his travel narratives from his two journeys up the White Nile to Gondokoro from Khartoum in 1849-50 and 1851-53. Original manuscript probably carried to Verona by I. Knoblecher, in who's arms A. Vinco died in Gondokoro on 22 January 1853. It later appeared in the *Annali della Societa di Maria per le missioni cattoliche*, Verona 1857, was translated to English by F. Sembiante and reprinted in *Annali Lateranesi*, Roma IV, 1940, pp. 300-28 and reproduced in the present volume. A. Vinco was the first missionary to live and die among the Bari. He gives a lively account of his visits to different parts of the area and the lives of the Bari groups.

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A letter from the author's travels up the White Nile from Khartoum to the river Sobat and Bahr-el-Jebel in 1854- 55. He describes these river systems and gives his version of the relations between the Nilotic tribes. He describes a war between the Dinka and Nuer in 1855, and also the trading conditions and relations to the 'Turcs', including the ivory and slave trade. He goes as far up as the Bari country in Belinyang.

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H. Darley, 1926. *Slaves and ivory, a record of adventure and exploration among Abyssinian slave-raiders*. London, Witherby. 219 pp.

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J.P. d'Arnaud, 1843. Documents et observations sur le cours du Bahr-el-Abiad ou Fleuve Blanc, (etc.). *Bulletin de la Société Géographie* 2.ser. Nov. Vol.20.

J.P. d'Arnaud, 1843. *Second Voyage à la recherche des Sources du Fleuve Blanc. Bulletin de la Société de Géographie* 2e sér. 19. Febr.: 89-97.

A letter from M. d'Arnaud in Cairo on January 12 1843 to the Société de Géographie recounting the second journey by the Viceroy of Egypt to discover the sources of the White Nile. A brief description is given of the Nile water system between the Blue and White Nile junction in the north to the 4th parallel in the south. The course of the river south of Belinyang and the Bari country was unknown to this author and the European geographers, and consequently still a matter of speculation. A map indicates the sources to originate south-east in the Abyssinian highlands. A brief account of the population groups living along the Nile in this area mentions Arabs, Shilluk, Dinka and Bari. A note by the editor, Jomard, is added with further speculations on the subject, relating it to other travellers. In a letter sent to the Society by the same author on May 10 1843 he gives some further comments on the origin of the Nile, and affirms his earlier theory on the easterly direction of the Nile sources. (pp. 444-446 BSdG)

J.P. d'Arnaud, 1844. Extract from letter to E.F. Jomard on supposed western tributary of White Nile. *Bulletin de la Société Géographie* 2.

M. Le Duc D'Aumont, 1883. Du Caire Gondokoro et au mont Redjaif. *Bulletin de la Société Khédiviale Géographie* 2: 191-202.

Duke d'Aumont et de Villequier, also known as Louis-Marie-Joseph, travelled from Cairo to Rejaf between 1855/56 by boat. His notes mention dates of arrival at Shilluk, Dinka, Nuer and Se're' countries, and also mention the government stations, Nuer-Shilluk feud, the river Sobat, water vegetation, and Gondokoro and Rejaf areas.

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Narrates a business trip to Sobat to buy ivory from the Dinka, Nuer and Shilluk.

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'Recent discoveries at the White Nile undertaken by Andrea De Bono and written by himself.' - where the author travelled by boat to Gondokoro and further up the Nile to Madi country, Makedo rapids, east to Liria and west to Jur river. A detailed map is attached.

A. De Bono, 1862. Voyage au Fleuve Blanc en 1861. *Nouvelles Annales des Voyages, de la géographie, de l'histoire et de l'archéologie* Ser.6 t.3: 5-38.

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A translated reprint of his original 'Recenti Scoperte..' Debono traded in the White Nile - Bahr el Jebel area and was the first European to explore the Lotuho country (Liria).

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M.A. Debono, 1862. Fragment d' un Voyage au Saubat (Affluent du Nil Blanc). *Le Tour du Monde* 2: 348-352.

Narrates a business trip to Sobat to buy ivory from among the Dinka, Nuer and Shilluk.

É.L.J. Deburaux, 1901. *Les aventures scientifiques. Trois reporters à Fachoda*. Paris, Combet. 232 pp.

A journalistic account of a journey by three travellers from Alexandria to Fashoda in 1898. They witnessed the battle of Omdurman from a balloon, and travelled by boat up to Fashoda, and reported on what they saw. The title is therefore somewhat misleading

J.T. Dennis, 1913. *From cataract to Equator*. Boston, The Gorham Press. 217 pp.

An account of a journey up the Nile from the cataracts to Gondokoro probably around 1910 (undated). 16 illustrations, all from south Sudan.

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Capt. F.A. Dickinson, 1910. *Lake Victoria to Khartoum, with rifle and camera*. London, New York, John Lane.

A description of his journey down the Nile, tales of sport and interesting photos of the Nile.

C. Didier, 1858. *500 Lieues sur le Nil*. Paris, L. Hachette.

La - Direzione, 1875. Le recenti esplorazioni nel Bacino del Nilo. *Bolletino della Societa Geografica Italiana* 12: 682-715.

A summary of "discoveries" of the sources of the Nile, partly abstracted from Geographical Journal, London. Reports on the travels and accounts of Col. Long, Gen. Gordon's chief of staff, from his travels to Uganda and discovery of a new part of Lake Victoria. Also includes three letters from E.M. Stanley written at Mpuapua at Lake Victoria and Ulagalla, in March and April 1875. He describes his journey from Congo and the discovery of the Victoria Nile. An editorial note at the end compares this latest discovery by Stanley with earlier information by Grant, Speke etc.

La - Direzione, 1876. Carta del corso del Nilo da Regaf a Labore. *Bollettino della Societa Geografica Italiana* 13: 141-142.

Presentation of a map drawn by Col. Gordon on the watercourse of the Nile between Rejaf and Labore and all the government stations.

La - Direzione, 1891. Dal libro del Magg. Gaetano Casati. *Bollettino della Societa Geografica Italiana* 28 (5): 473-485.

A review of the travels by G. Casati with a map showing his travel-route. Much of it passes through what was later called Bahr al Ghazal and Equatoria.

C.W. Domville-Fife, 1927. *Savage Life in the Black Sudan*. London, Seely, Service & Co. 284 pp.

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H. Dufton, 1870. *Journey trough Abyssinia in 1862-63*. London.

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A journalistic account of the author's travels up the Nile to Rejaf hill, Mongalla prov. (later Equatoria). Illustrated with 54 photographs, 14 from the south. The author visited Shilluk, Dinka and Fajelu areas. A film was also made from the journey.

A.R. Dugmore, 1938. *Through the Sudan*. 1 Pitman's travel service. London, Pitman and Sons. 101 pp.

A travel guide to the Sudan, based on the author's travels up the Nile in 1924, his subsequent film and book, *The vast Sudan*. 4 chapters deal with the southern region, mostly animal life and hunting possibilities. 14 photographs illustrated the text, 6 from the south. Aerial photographs show several animal herds (and also how the capital was extended at the end of the 1930s).

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Useful study of the region.

A.B. Edwards, 1877 (1982, 1991). *A thousand miles up the Nile*. London, Longmans, Green & Co. 720 pp.

An account of a journey to Wadi Halfi by a British woman in the years immediate before the British occupation of Egypt, 'taken refuge in Egypt... to get out of the rain'. She claims that the Egypt she witnessed was the same as could be seen in the wall-paintings of the pharaonic tombs.

C. Eliot, 1902. Notes of a Journey through Uganda, down the Nile to Gondokoro, (July, 1902). *Geographical Journal* 20: 601-609.

Contains a description of the Victoria Nile and the Bahr al-Ghazal by the High Commissioner for the East Africa Protectorate.

C. Eliot, 1906. From Mombasa to Khartoum: Through Uganda and down the Nile. *Scottish Geographical Magazine* 22 (7): 341-355.

Relates his journey in July and August 1902 from Lake Victoria to Cairo, but concentrates on an account of the Nile basin between Equator and eight degrees north of it, i.e. the area south of the Sobat. Based partly on a lecture delivered to the Scottish Geographical Society on November 28, 1905.

C. Eliot, 1966. *The East Africa Protectorate*. London, Frank Cass. 334 pp.

The High Commissioner for the East Africa Protectorate from January 1901 to June 1904 (when he was forced to resign after Foreign Office intervention) gives his description of the Upper Nile area in Uganda, depicting it as a 'tabula rasa, an almost untouched and sparsely inhabited country, where we can do as we will' (p. 3). One chapter is entitled 'A journey down the Nile' (p. 280-303). Eliot supported Garstin's plan for a regulator on the Ripon Falls and embankment of the river for about fifty miles of its course through Lake Kioga, and another regulator at the outlet from Lake Albert (p. 300). He calls Garstin's book 'the most interesting book of this young century' (p. 299). The first edition was published in 1905.

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P. Frey; G. Brunold, 1993. *Der Nil*. Basel, Wiese Verlag.

A. Friedrich, Herzog zu Mecklenburg, 1912. *Vom Kongo zum Niger und Nil. Berichte der deutschen Zentralafrika-Expedition 1910/1911*. (2 vols.). Leipzig, F.A.Brockhaus. 324 + 398 pp.

These 2 volumes are based on the 2nd scientific expedition by the author to central Africa. From the Congo-Uele basin the expedition entered the southern Sudan via two routes: Tombura-Wau-Jur-River Nile and Yei-Lado-Bahr el Jebel-River Nile. Geographical, botanical, zoological, ethnographical and other types of information are given, and are richly illustrated by photos and drawings.

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F. Gessi; M. Camperio, 1891. *Setti Anni nel Sudan egiziano, Memorie di Romolo Gessi*. Milano, Chiesa e Guindani. 489 pp.

Gessi's memoirs were posthumously edited by his travel companion, Camperio. An account of his careers as explorer and soldier, with emphasis on his last years in Sudan. Gessi joined Gordon in 1874, serving as his engineer in Equatoria. He later became governor of Bahr el Ghazal. Died at Suez in 1881.

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R. Gessi, 1881. Relazione e diario sul Bahr-el-Ghazal e sul viaggio della 'Safia' da Meshra-er-Rek a Khartum. *Bolletino della Societa Geografica Italiana* 18: 185-204.

A letter and a publication of part of the author's diary between 25 September and 25 January 1880/81 describing his journey down the Nile and the blockade by the Sudd on his way to Khartoum. The diary describes the hardships etc. felt in these weeks, where many died of hunger and diseases in the Sudd area. Gessi almost died, but arrived in Khartoum in January, leaving more than 400 dead behind.

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C. Gleichen, 1897. *Report on the Nile and country between Dongola, Suakin, Kassala and Omdurman: describing the various routes bearing on this country*. London, War Office. 267 pp.

A report prepared in connection with the occupation of the Sudan, see next entry.

C. Gleichen, ed. 1905. *The Anglo-Egyptian Sudan: a compendium prepared by officers of the Sudan Government*. 2 vols. London, Printed for His Majesty's Stationery Office by Harrison and Sons. 371+236 pp.

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G.R. Gliddon, 1849. *Handbook to the American panorama of the Nile ... with a map of the basin of the Nile, according to the latest discoveries, projected by C.T. Beke*. London.

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A description of B.H. Jessen's travels in 1905. Jessen was, according to some sources, a Norwegian adventurer, who was paid by the American big-game hunter M.W. McMillan to be the first to travel the Blue Nile from the Sudan to Lake Tana in Ethiopia. I have tried to trace his identity in Norway, and I have contacted a number of Jessen-families, but with no success. In the literature he is also identified as a Dane.

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Paper presented to the International Conference on Water Resources, Needs and Planning in Drought Prone Areas, Khartoum, Dec. 6-12, 1986. Collaborator: UNESCO, UNDP, Sudan Engineering Society and International Association for Hydraulic Research. Argues that water can only be efficiently allocated when its value in alternative uses is compared. In this study linear programming was used to analyse the value of water used in irrigation for Gezira Scheme. Factors assumed to affect the estimates of value include the productivity of water, its scarcity, efficiency of field water use, planting dates, crop prices, crop yields and production costs.

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This book by the then Under-Secretary of State starts with the following sentence: 'Egypt is by nature a rainless desert which the Nile, and the Nile only, converts into a garden every year'. Gives a broad overview of the irrigation projects implemented and planned in Egypt at the time. Mostly concerned with Nile projects within Egypt's border.

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F.M. Ramadan, 1972. Characterization of Nile waters prior to the High Dam. *Z. Wasser Abwasser Forsch.* 5: 21-24.

L. Resende; M. de Moura, 1988. *Developing the Egyptian Nile: Hydropolitical influences and implications*. PhD thesis, University of Pennsylvania. Pennsylvania. 324 pp.

Discusses past and present river basin development patterns and the impacts of water development projects in the Nile region. The relationship between the Aswan High Dam and other water-related projects and their influence on the Basin's social, cultural, environmental, and economic framework is focused. Raises questions regarding the 'water future' of Egypt but also of the Sudan and other the Nile Basin countries' future.

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Written by the Principal Hydrologist, Ministry of Water, Energy and Minerals, Tanzania, this article discusses in very general terms what the author describes as "the vital need for environmental sustainability in managing transboundary river basins".

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The study deals specifically with sources of water, including rainfall, surface water, ground water and also conservation of water lost in the swamps in the Southern Sudan.

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Written by the Minister of Irrigation, Egypt, this article outlines the Egyptian policy in the late 1970s for developing and using the water resources. Water requirements for cultivated lands are reviewed. Argues that the re-use of suitable drainage water for irrigation purposes would aid in conserving freshwater supplies. Underground water resources are discussed. Water resources developed from upper Nile river projects are identified in line with those proposed in the Nile Waters Agreement of 1959 and their net gain is estimated at 18 milliard cubic metres annually.

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Categories:

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HE = Health

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PH = Political and Cultural History

PR = Projects and Reports

TE = Travel and Exploration

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