Preface

The decision to add to the existing books on the Nile needs explanation. The main sources of information on the hydrology of the Nile are the books written by Dr H. E. Hurst and his collaborators. *The Nile* (Hurst, 1952 and 1957) deals with the river on a fairly popular level and the more technical volumes of *The Nile Basin* deal in turn with the different tributaries. These books are underpinned by Hurst's 60 years of experience on the Nile, including field work throughout the basin. They include numerous photographs, descriptions and technical analysis. However, the detailed books are of limited availability and seven volumes, in addition to the statistical volumes, are required to cover the whole area. Dramatic changes have occurred in the hydrology of the Nile since most of these volumes were produced, and the evidence of these changed conditions has not been assimilated into accounts of the whole basin.

Later books by Rzóska (1976), Shahin (1985) and Said (1993) are useful additions to the corpus. Rzóska dealt particularly with the biology of the basin; Shahin covered the climate and hydrology, and presented a mass of records which he analysed statistically; Said discussed the evolution of the river, the long-term river flows, and the history of water use. Howell *et al.* (1988) and Howell & Allan (1994) concentrated on specific topics: the Jonglei Canal and its effects and water management. The present authors contributed to both these books but feel that there is a need for an account of the whole basin which describes the present hydrology in its historical setting. This book takes account of recent changes, and in particular the change of regime of the Lake Victoria basin which occurred after 1961. It does not attempt to cover water quality or groundwater resources.

Several recent unpublished studies of the hydrology of different parts of the Nile basin do not appear to take full advantage of available knowledge. The whole basin is linked so that evidence from one tributary can be vital to the study of another; for example, flows at Aswan confirm evidence of early levels of Lake Victoria. This book is intended for hydrologists and water resource engineers confronted with such studies, who could benefit from an overall view of the river. It is hoped that the account will also be of interest to a wider readership. The book presents an account of the hydrology of the whole basin, dealing with each tributary in turn but drawing attention to links between reaches. Indeed, the Nile is shown to be one long interconnected hydrological entity, with slowly altering baseflow, each reach superimposing a seasonal fluctuation derived from the hydrological characteristics of the immediate region. The relationship between hydrology and vegetation affects the economy of the wetlands of the White Nile basin, and this relation is discussed.

Although he cannot claim the detailed experience of Hurst, John Sutcliffe has visited most of the Nile system during a career as a hydrologist who has continued to "drink the waters of the Nile". His initial experience during the 1950s as a member of the Jonglei Investigation Team was concentrated on the Bahr el Jebel flood plain. It included surveys on the Bahr el Ghazal, the Kinyeti to the east of the Bahr el Jebel, the Khor Fullus tributary of the Sobat, and along the White Nile reach. His subsequent research on the hydrology of the Sudd region included the ecology of the flood-plain grazing. He has taken part in studies of the upstream effects of a possible dam on Lake Albert, the effects of a potential hydroelectric project on the Kagera, and the water balance of Lake Victoria. He has also taken part in water resources planning for Sudan, and a hydrological study of

the impact of a revised Jonglei Canal project. Recent studies have included hydrological assessments of Sudan and Uganda, a study of the 1988 floods on the Blue Nile and Atbara, and hydrological aspects of hydroelectric planning for Uganda and Sudan. He has also taken part in a number of conferences on the Nile, including a keynote paper on the wetlands of the upper Nile, and has discussed Nile problems in Egypt.

Yvonne Parks has collaborated in assessment of the effects of the Jonglei Canal and hydrological studies of the wetlands of southern Sudan, which form the core of this book, and in the course of water resources studies in various parts of Africa has visited the Bahr el Ghazal, White Nile and Blue Nile tributaries.

Most of the basic data used in this study have been published in the relevant Supplements of *The Nile Basin*, or in other countries' yearbooks. They have not been reproduced here, but use has been made of diagrams to illustrate trends and flow patterns. The emphasis has been on basic hydrological processes, though some mention has been made of water resources problems and projects in order to put the hydrology in its practical context.

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The choice of place-names presents some problems, as rivers tend to have different names in different countries and change over short distances. Some names have been changed in recent years, but some have been changed back after political changes. The better known names have been used in general, in order to facilitate international reading. Although the metric system has always been used in Nile studies, some units like "milliards" ($m^3 \times 10^9$ or km^3) and millions per day ($m^3 \times 10^6$ day^{-1}) are generally used and understood; some compromise has been made.

Some expressions peculiar to Nile studies require explanation. Timely water is water arriving at a time when the natural supply is inadequate for irrigation, and is roughly 1 February to 31 July at Aswan; at sites upstream the period must allow for time of travel, and at Malakal, for example, is 21 December to 20 June. Century storage describes overyear storage sufficient to guarantee a steady discharge equal to the average over a period of 100 years. It will be noted that the provision of overyear storage reduces the importance of timely flow. An attempt has been made to list references to assist further research.