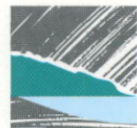


A DATABASE OF URBAN STORMWATER QUALITY REFERENCES

H.P. Duncan

Report 95/7
June 1995



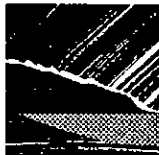
COOPERATIVE RESEARCH CENTRE FOR
CATCHMENT HYDROLOGY

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CATCHMENT HYDROLOGY**

Duncan, H. P. (Hugh P.), 1951 -
A database of urban stormwater quality references

Bibliography.
ISBN 1 876006 04 8..

1. Storm sewers - Bibliography. 2. Urban runoff - Bibliography.
3. Water quality - Bibliography. 4. Water quality management -
Bibliography. I. Cooperative Research Centre for Catchment
Hydrology. II. Title. (Series: Report (Cooperative Research Centre
for Catchment Hydrology); 95/7).

016.62810994

Keywords

Storm Sewage
Water Quality (Natural Waters)
Databases
Urban Areas
Runoff (Urban)
Bibliography
Stormwater Management

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ISSN 1039-7361

PREFACE

The Cooperative Research Centre for Catchment Hydrology's Urban Hydrology research program comprises two main projects. The first investigates methods for estimating runoff and pollution loads from urban catchments over a range of time and space scales. The second brings together several studies aimed at improving design and management procedures for urban waterways.

This report and database were prepared by Hugh Duncan, seconded to the CRCCH from Melbourne Water, and form part of a review of urban stormwater quality literature. The main objectives of the review are to assess the current status of urban stormwater quality research, to facilitate access to existing information, and to establish priorities for future work.

Tom McMahon
Program Leader, Urban Hydrology
Cooperative Research Centre for Catchment Hydrology

ABSTRACT

The database on the enclosed disc forms part of a review of the English language literature on urban stormwater quality, and includes over 700 references on the subject. The database has been set up on the MS-DOS version of the EndNote Plus® bibliography system. Information recorded includes full reference details, key words, and notes on each document and its relevance to urban stormwater quality. Users should have access to the EndNote Plus® program and be familiar with its operation, as the program and documentation are not included.

The report describes the scope, structure, and spelling conventions of the database, and lists the key words used. The layout and extent of recorded information are illustrated by example for common reference formats.

TABLE OF CONTENTS

1. INTRODUCTION	1
2. SCOPE	1
3. STRUCTURE	1
4. SPELLING	2
5. EXAMPLES	3
6. REFERENCES	5

A DATABASE OF URBAN STORMWATER QUALITY REFERENCES

Introduction

The database on the enclosed disc forms part of a review of the English language literature on urban stormwater quality, and includes over 700 references on the subject. It has been prepared by the Cooperative Research Centre for Catchment Hydrology, to improve access to what is now a substantial body of literature. The database has been set up on the MS-DOS version of the EndNote Plus® bibliography system. Other parts of the review process include an annotated bibliography of urban stormwater quality (Duncan, 1995a), and a review of urban stormwater quality processes (Duncan, 1995b). Copies of the reports and database are available from the Centre Office, CRC for Catchment Hydrology, Monash University, Clayton, 3168, Australia.

Scope

The central theme is urban stormwater quality, as seen from an Australian perspective. More precisely, it is concerned with the quality of flow in a separate drainage system resulting from rain falling on urban, suburban, and developing areas, and the effect of this flow on receiving waters. Around this central core are many related topics - atmospheric quality and dustfall, sewage management and treatment, rural water quality, and others - and the distinction between topics is often blurred. These peripheral areas are selectively covered. Intentionally combined stormwater and sanitary sewers are not common in this country, so the extensive North American literature on combined sewer overflows is included only when results are also applicable to a separate drainage system. Similarly, urban snow removal in Australia is confined to localised resort areas which are not typical of major urban centres, so papers on this topic are only selectively included. In all the peripheral areas, the line between inclusion and exclusion is necessarily somewhat arbitrary.

The review is extensive but by no means complete, even allowing for the boundary problem noted above. Papers central to another discipline, but also of relevance to urban runoff quality, are difficult to locate reliably. Access can be a problem in some cases. In particular, many reports prepared by or for the United States Environmental Protection Agency are not readily available here, and time and staff resources do not permit access to all of them. We rationalise this limitation by assuming that most significant results from these prime sources will also be published in the journal literature, and will be referenced here from that source. Of course, a reading list on either core or peripheral topics could be extended by reference to the bibliographies of the papers included here, and from the proceedings of conferences noted in the reference list.

Structure

The database has been set up on the MS-DOS version of the EndNote Plus® bibliography system. Information recorded includes full reference details, key words, and notes on each document and its relevance to urban stormwater quality. Users should have access to the EndNote Plus® program and be familiar with its operation, as the program and documentation are not included. The program can be used to create a reference list linked to a document, to create an independent bibliography, and to search for any word or character string in any field.

Most fields in the data base are used to record standard reference details such as author, title, year of publication, and the like. In a few cases, however, the fields are specific to the urban water quality project, and these are briefly described here.

The Label field is intended for use with an indexing system that is not used in this review. Instead, the field in many cases contains the call number of the book or reference in the Melbourne University Library catalogue. It is unlikely to provide an exact match to the call number of the document in any other library.

The Notes field is used for a general description of the reference, as it applies to the subject of urban stormwater quality. It usually includes an outline of the study, the location, the water quality parameters measured or discussed, and a summary of the conclusions. It may include cross references and further discussion of results and conclusions. Location includes the State in the case of the United States, and the country for all other places.

The Abstract field is not used, since the relevance of a publication to urban stormwater quality may not be central to the author's intention. Where relevant, parts of the document's abstract may be included in the Notes field.

The Key Words field is reserved for general concepts, rather than specific words (such as locations or water quality parameters) which will also occur in the Notes field. Key words have been allocated to each reference to describe the type of work, and the parts of the water cycle investigated or discussed. One reference may have more than one key word allocated to it from each list. The key words used are:

Type of work

data collection and presentation
data analysis
statistical analysis
process analysis
modelling
system **management** and operation
water **treatment**
legal issues
subject **overview**
literature review

Part of water cycle

air quality and contaminants
rain fall
snow fall
buildup process
washoff process
snowmelt quality
runoff quality
combined sewer overflow (CSO) quality
sewage quality or effect
effect of **storage** on quality
effect on **receiving water**
effect on **sediment** in storage or receiving water

Spelling

Spelling generally follows the conventions of the Macquarie Dictionary in the reviewer's own text, but the spelling of reference titles and direct quotes always preserves that of the original. Therefore where alternative spellings are likely (such as in modeling/modelling, optimise/optimize, etc.), it would be prudent to either include both forms in a word search, or use a distinctive element common to both (model, optimi, etc.). Letters with accents or other marks are represented by the unadorned English letter, regardless of the linguistic significance of the mark. Thus e is used for ê, a for å, and so on. Although EndNote Plus® can handle these characters, it can not recognise the plain and adorned characters as being equivalent, so a

user of the search facility would need to specify all marks correctly. For consistency and simplicity, all such marks are omitted from this review.

Examples

To illustrate the format and typical content of database entries, samples are shown below for three common reference types - conference proceedings (Ahern et al., 1981), journal article (Alley and Smith, 1981), and report (Moodie, 1979). Other reference types use a similar format, modified as appropriate for each type.

Reference Type **Conference Proceedings**

Author

Ahern, J.J.
Armstrong, D.E.
Stanforth, R.R.

Year of Conference

1981

Title

Storm Water Loadings in Runoff from an Urban Area in Madison, Wisconsin

Editor

Ben Chie Yen

Conference Name

Urban Stormwater Quality, Management, and Planning, Proceedings of the Second International Conference on Urban Storm Drainage

Conference Location

Urbana, Illinois

Publisher

Water Resources Publications, Colorado

Pages

19-28

Keywords

data, runoff, receiving waters

Notes

Describes a study of nutrient and sediment loadings from a separate storm sewer system from a residential catchment in Madison, Wisconsin. The catchment is University Bay watershed, which drains to Lake Mendota. The lake had remained eutrophic after the diversion of industrial and municipal effluents. Quality parameters are dissolved reactive phosphorus, total dissolved phosphorus, acid soluble phosphorus, total phosphorus, ammonia, nitrate, total Kjeldahl nitrogen, total suspended solids, volatile suspended solids, COD, alkalinity, specific conductance, and chloride. Estimated annual contaminant loadings are tabulated. The highest pollutant loadings occurred during storm events. Highest loadings for most constituents occurred during seed fall in late spring and early summer.

Reference Type Journal Article

Author

Alley, W.M.
Smith, P.E.

Year

1981

Title

Estimation of Accumulation Parameters for Urban Runoff Quality Modelling

Journal

Water Resources Research

Volume

17

Issue

6

Pages

1657-1664

Keywords

process, analysis, buildup

Notes

Describes a method of estimating pollutant accumulation parameters for impervious urban areas. Discusses the formulation of exponential buildup and washoff processes, and the sensitivity of the parameters. Demonstrates the parameter estimation procedure on a 5.95 ha urban catchment near Miami, Florida. Quality parameters are total nitrogen, total lead, and suspended solids. The exponential parameters fitted effectively gave a straight line buildup on top of the load already present. Existing load was best simulated using an equivalent buildup time, and is an important element of the process.

Reference Type Report

Author

Moodie, A.R.

Year

1979

Title

Modelling of Water Quality and Hydrology in an Urban Watercourse

City

Melbourne

Institution

Swinburne College of Technology

Report Number

AWRC Technical Paper No. 45

Keywords

data, modelling, runoff

Notes

Describes a study of water quantity and quality in Gardiners Creek, Melbourne, Australia. Both hydrologic and water quality models have been developed. Summarises the history and layout of the catchment, and provides a detailed discussion of models and modelling techniques. Presents results from a weekly survey of water quality at twelve sites along the main stream of the creek. Sampling of medium to high flows appears to be quite good, although it is unlikely that very high flows are well sampled using a regular schedule of measurements. Dissolved oxygen levels are high, and are highest in summer, during low flow, and in the evening, all of which suggest substantial input from photosynthetic activity of the observed attached bottom weeds. BOD is typically from 4 to 20 mg/L, and is lower in summer than winter. Turbidity is high - typically 30 to 60 units for low flow, and often greater than 100 for high flow. Suspended solids are also much higher during high flows. Electrical conductivity increases steadily from about 200 micromhos/cm at Blackburn Lake near the headwaters to about 2000 upstream of Scotchmans Creek, then gradually decreases again further downstream. Conductivity is lower for high flow conditions, and vice versa. Estimated residence time under low flow conditions is about 15 to 20 hours, and significant BOD loss by sedimentation and biological action is believed to occur. A first flush effect is observed.

Two simple water quality models are developed and fitted - one for conservative parameters, and one for BOD and dissolved oxygen based on the Streeter-Phelps equations. Goodness of fit of the first model is moderate, at best, but the second model appears to be satisfactory. It is used to predict the effect of concrete lining or ornamental pools in the reaches downstream of Scotchmans Creek.

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The Cooperative Research Centre for Catchment Hydrology
is a cooperative venture formed under the Commonwealth CRC Program between:

Bureau of Meteorology

CSIRO Division of Water Resources

Department of Natural Resources and Environment

Goulburn-Murray Water

Melbourne Water

Monash University

Murray-Darling Basin Commission

Southern Rural Water

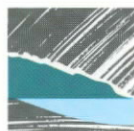
The University of Melbourne

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Associates

CSIRO Division of Soils

State Forests of NSW



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