BASICS OF HYDROGEOLOGY

First Edition

Author

Dr. Samiran Mahapatra (M.Sc.Tech, M.Tech, Ph.D)



Title of the Book: Basics of Hydrogeology

First Edition - 2026

Copyright 2026 © Dr. Samiran Mahapatra, M.Sc.Tech, M.Tech, Ph.D, Associate Professor and Head**,** Department of Geology, Durgapur Government College, West Bengal, India.

No part of this book may be reproduced or transmitted in any form by any means, electronic or mechanical, including photocopy, recording or any information storage and retrieval system, without permission in writing from the copyright owners.

Disclaimer
The author is solely responsible for the contents published in this book. The publishers don't take any responsibility for the same in any manner. Errors, if any, are purely unintentional and readers are requested to communicate such errors to the author or publishers to avoid discrepancies in future.

ISBN: 978-1-68576-687-0

MRP Rs.160/-

Publisher, Printer & Distributor:
Selfypage Developers Pvt Ltd.,
Pushpagiri Complex,
Beside SBI Housing Board,
K.M. Road Chikkamagaluru, Karnataka.
Tel.: +91-8861518868
E-mail: info@iipbooks.com

IMPRINT: IIP Iterative International Publishers

For Sales Enquiries:
Contact: +91- 8861511583
E-mail: sales@iipbooks.com

Dedicated to

My father
late Ashok Kumar Mahapatra
&
My mother
late Jharna Mahapatra

PREFACE

Water shapes our world, yet the vast hidden reservoirs beneath our feet remain a mystery to many. This book introduces the core principles of hydrogeology in clear, lucid, everyday language with a few preliminary essential mathematical derivations. Traditional texts often rely on heavy, advanced mathematics, that can obscure the physical realities of groundwater moving through soil and rock.

This book is an offshoot of what I have learned during my college days at Indian School of Mines (now IIT-ISM), Dhanbad, amalgamated with my 30 years of teaching experience. A book of this type could not have been written without heavy borrowing from published resources. Class lectures of my respected Professor Y. R. Dhar of ISM, Dhanbad, has also helped me a lot. Groundwater pollution and groundwater management, which demand separate discussions altogether have been kept outside the scope of this book.

The book has been written following the new National Education Policy (NEP), 2020 syllabus, adopted by different universities across India.

Finally, I would like to express my gratitude to my wife Mahasweta, my daughters Oindri and Meghna, my friend Pallab Ghosh, Prof. Kalyan Adhikari of NIT, Durgapur and Mr. Malay Bikas Sikdar for their active support throughout the course of writing. I shall deem my efforts successful if the book proves useful to my Geology students, whom it is meant for.

Samiran Mahapatra

TABLE OF CONTENTS

Chapter No.	Chapter Name	Page No.
Chapter 1	Introduction	1-8
Chapter 2	Vertical Distribution of Groundwater	9-13
Chapter 3	Aquifers	14-17
Chapter 4	Hydraulic Properties	18-41
Chapter 5	Groundwater Provinces of India	42-46
Chapter 6	Groundwater Exploration	47-64
Chapter 7	Salinity in Coastal Areas	65-70
Chapter 8	Groundwater Recharge	71-75
Chapter 9	Groundwater Fluctuation	76-79
Chapter 10	Quality of Groundwater	80-85
Chapter 11	Water Quality Plots	86-90
Chapter 12	Water Wells	91-93
	Epilogue	94
	References	95-96
	Index	97