

**Water Quality Monitoring - A Practical Guide to the Design and Implementation of Freshwater Quality Studies and Monitoring Programmes**

Edited by Jamie Bartram and Richard Ballance

Published on behalf of United Nations Environment Programme and the World Health Organization

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**Water Quality Monitoring - A Practical Guide to the Design and Implementation of Freshwater Quality Studies and Monitoring Programmes**

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## **FOREWORD**

According to Agenda 21 of the United Nations Programme of Action following the Earth Summit in Rio de Janeiro:

*"The complex interconnectedness of freshwater systems demands that freshwater management be holistic (taking a catchment management approach) and based on a balanced consideration of the needs of people and the environment. The Mar del Plata Action Plan has already recognised the intrinsic linkage between water resource development projects and their significant physical, chemical, biological, health and socio-economic repercussions"*

The approaches and methods for water quality monitoring described in this handbook are based upon the experience gained, over two decades, with the design and establishment of the global freshwater quality monitoring network, GEMS/WATER. The GEMS/WATER programme is co-sponsored by the United Nations Environment Programme (UNEP) and the World Health Organization (WHO), together with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Meteorological Organization (WMO). One of the goals of GEMS/WATER is:

*"to strengthen national water quality monitoring networks in developing countries, including the improvement of analytical capabilities and data quality assurance"*.

This handbook supports this goal by providing a practical tool for use in water quality management by national and local agencies and departments dealing with water quality issues.

*Water Quality Monitoring* and its companion guidebook *Water Quality Assessments. A Guide to the Use of Biota, Sediments and Water in Environmental Monitoring*, Second edition (edited by Deborah Chapman and published on behalf of UNESCO, WHO and UNEP by Chapman & Hall, London, 1996) constitute principal methodology guidebooks developed and used in the monitoring and assessment activities of GEMS/WATER. Together they make a direct contribution to capacity building in the area of water quality monitoring and assessment.

This book brings together the information necessary to design and implement a water quality monitoring programme and provides a basis for water quality assessments and studies of the impact of pollution on the natural environment. Freshwater quality is addressed in a holistic way, considering both surface waters and groundwaters. Emphasis is given to monitoring the natural environment and to detecting and monitoring trends in water quality.

The book outlines general considerations related to water quality monitoring, provides a general protocol for a monitoring programme and includes such elements as staff requirements, staff training and the equipping of analytical laboratories. It also includes consideration of the problems that may be encountered when implementing programmes in remote areas and developing countries and when establishing water quality monitoring programmes from scratch.

It is hoped that the approaches and methods described will be useful for anyone concerned with water quality monitoring whether they have a scientific, managerial or engineering background and including, particularly, field staff and those who may not be water quality experts. Potential users may be from local, regional or national government agencies, research groups, consulting firms or non-governmental organisations. This book will be especially useful to those who plan and manage the various aspects of water quality monitoring outside the framework of large established programmes, as may be the case in many developing countries and for specific projects and studies world-wide.

Material on sampling and analytical methods for the most important physical, chemical and bacteriological variables has been brought together here in a convenient form, with an emphasis on field techniques at a level suitable for those implementing water quality programmes. An overview of the principles underlying, and the importance of hydrological, biological and sediment measurements and their relevance to water quality monitoring is also included. Information on some of the commercially available analytical kits for use in the field is included in an appendix.

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An international group of authors provided material and, in most cases, several authors and their collaborators contributed to each chapter. It is difficult to identify precisely the contributions made by individuals and we apologise for any oversights in the following list of principal contributors.

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