

GUIDELINES of LAKE MANAGEMENT

Volume 4

Toxic Substances Management in Lakes and Reservoirs

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International Lake Environment Committee
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FOREWORD

S. Evteev

Natural and synthetically-produced chemicals represent a major paradox in our modern world. Millions of different chemical substances are used daily around the world, and have proven to be very beneficial to mankind in many ways. Examples of beneficial uses include destruction of disease-carrying organisms, enhancement of agricultural production, and generally increasing our health, comfort and well-being.

Unfortunately, there are also undesirable consequences associated with the use of these chemicals, particularly for some heavy metals and synthetic organic chemicals. Such materials, termed toxic substances, have the potential to fundamentally influence the character and environmental health of aquatic ecosystems, including the animal and plant communities contained within them. Many have also been shown to be hazardous to human health, via human consumption of aquatic organisms or other use of the water resource.

In spite of their widespread use, however, our knowledge of the human and environmental impacts of many chemicals remains grossly inadequate. We know very little about their movement, transformations, or ultimate environmental fate in aquatic ecosystems. In spite of this reality, however, there is every indication that the use of such chemical substances will increase in future years, in order to satisfy the growing requirements of increasing human population and development.

This guidebook, "Management of Toxic Substances in Lakes and Reservoirs", attempts to provide technical guidance to those concerned with the toxicology, environment fate, and modeling of toxic substances in these important water resources. It also provides guidance too individuals and agencies responsible for managing the quality and safety of lakes and reservoirs. It is hoped that both technical and non-technical audiences will find this guidebook useful in their daily work related to toxic pollution of these aquatic ecosystems.

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FOREWORD

Tatuo Kira

Nearly thirty-five years have already passed since the toxic contamination of aquatic ecosystems due to industrial wastes resulted in the first tragic events of *Minamata* and *itai-itai* diseases in Japan. We may also recall that Rachel Carson's *Silent Spring* was published just 30 years ago. Nevertheless, contamination from deleterious chemicals such as heavy metals and organochlorine compounds is still one of the most critical environmental problems in lakes, rivers and inland seas of the world. Even in developed countries, a number of water bodies still remain badly contaminated to the extent that local residents are strictly warned against carelessly eating fish or drinking water. During the course of the UNEP/ILEC Joint Survey on the State of World Lakes since 1987, we have been aware of the fact that the same is also the case with lakes in developing countries, but that reliable information is extremely limited in those countries. What we know might be but a small visible part of the huge hidden mass behind.

In addition to these so-called classical problems, the world is now facing a new type of toxic contamination by mutagenic chemicals, many of which are also carcinogenic. In the short term, these substances are much less harmful than the contaminants involved in classical pollution-diseases, but in the longer term they are no less dangerous. Their effects tend to appear after a long period and are therefore probabilistic. The assessment and management of their risks offer various difficulties, not only in establishing a theoretical basis but also in consistency with the conventional ways of people's thinking and social life. We have as yet, made only a few steps towards the effective control of this new type of toxic pollution.

Guidelines for the management of toxic contamination that cover these aspects are urgently desired, but apparently very difficult to be concise and complete. This volume is a challenge to this hard task, reviewing diverse aspects of the problem from the ecotoxicological viewpoint and presenting basic concepts and management experiences based on several case studies. ILEC hopes that lake environment managers will find it useful and helpful for their work.

Many thanks are due to the editor, Professor Saburo Matsui, and all the contributors to this book for their effort and cooperation, and to the United Nations Environment Programme and Shiga Prefectural Government for their continued support.

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