
Preface

Anyone who can solve the problems of water will be worthy of two Nobel Prizes—one for Peace and one for Science

John F. Kennedy

Water is an indispensable resource and essential life supporting factor. On the hydrological map of the world, eutrophication is one of the great issues causing degradation of these freshwater ecosystems. The excessive nutrient enrichment of waters results in change of oligotrophic water bodies to mesotrophic, eutrophic and finally to hypertrophic. The major nutrient sources for enrichment of aquatic ecosystems are sewage, household detergents, industrial discharges, runoff from agriculture, construction sites, and urban areas. Eutrophication is a threat for water used in fisheries, recreation, industry, and drinking as it causes the increased growth of cyanobacteria and aquatic macrophytes resulting in low oxygen, death, and decomposition of aquatic flora and fauna. Thousands of lakes and reservoir estuaries and wetland around the globe near the large population centers has been deteriorating due to rising nutrient levels and other chemical pollutants causing changes in their ecological structure and function. Eutrophication can be minimized by reducing nutrient use in fertilizers and household detergents. The economic analysis is urgently required and devising some policies to make desired changes in agricultural practices is needed to control the eutrophication. The improved soil management practices, treatments of water, mathematical models, and bioremediation are some of the effective tools to combat eutrophication in aquatic ecosystems. The public awareness and education on eutrophication also play an important role in preventing the eutrophication of water bodies.

The consequence of man-made eutrophication of freshwaters is severe deterioration of water quality which is now a big matter of interest for the scientific community. The research in this field has suddenly increased in last few years and many books, research papers, reviews, and articles which dealt with eutrophication and related management issues have been published so far. In this series of publications, we have taken the task to publish the second volume of the book “Eutrophication: Causes, Consequences and Control” after the successful publication of its first volume in 2011. Eutrophication: Causes, Consequences and Control Volume-II covers a collection of 18 chapters written by 44 experts. The book presents the latest literature and research findings on eutrophication. The chapters from this book provide complete information on the topic of eutrophication and its related areas. It can be a resourceful guide suited for scholars and researchers. Chapter 1 will give general information including definitions, drivers, environmental conditions, and the control measures of eutrophication. Chapter 2 highlights the changes in the delicate balance between seasonal, spatial, and littoral dynamics, and the resulting biogeochemical changes in the eutrophic water bodies. Chapter 3 deals with impacts of eutrophication on the structure and functioning of aquatic ecosystem. Chapter 4 focuses on the economics related to eutrophication and its control measures. Chapter 5 covers the cultural eutrophication in lakes leading to the degradation of water quality and depletion of aquatic biodiversity. Chapter 6 deals with the structure and components of the food webs and trophic links between them in eutrophic lakes.

Chapter 7 focuses on anthropogenic perturbations on freshwater ecosystems as a consequence of tourism. The lakes, ponds, and other freshwater reservoirs are the places of attraction for the public which causes touristic impacts on the reservoirs especially in terms of

eutrophication. Chapter 8 gives information about the eutrophication in the Great Lakes of the Chinese Pacific Drainage Basin. The changes, trends, and management strategies are elaborated in this chapter. Chapter 9 discusses the changes in photoautotrophic productivity of lakes, reservoirs, rivers, and streams under the direct threat of eutrophication. Chapter 10 deals with nutrient dynamics in the inner Saronikos gulf and the changes occurred over the last 25 years due to the sewage discharges releasing from the Sewage Treatment Plant of Athens in Psittalia Island. The environmental status of the inner Saronikos gulf is also presented in this chapter. Chapter 11 sheds light on eutrophication and its associated changes in salt marshes which have an important role in biogeochemical cycles. Chapter 12 covers research work to evaluate the role of phosphate-containing household detergents in the eutrophication and deterioration of fresh water ecosystems.

Chapter 13 deals with the hypothesis of the trophic cascade relations especially between fish trophic guilds, limnology, and application of morphoedaphic index studied in the Itaipu Reservoir (Brazil). Chapter 14 describes the eutrophication status in seven coastal estuaries of southeast Australia where phytoplankton species diversity and their ecological characteristics were found as strong indicators of eutrophication. Chapter 15 deals with the biogeochemical indicators of eutrophication in wetlands. Chapter 16 deals with role of mineral nutrients in eutrophication. Chapter 17 is about the development of sustainable phytoremediation systems and the most suitable environmental conditions to recover the nutrients from eutrophic waters. Chapter 18 covers the eutrophication studies on King Abdullal Canal in Jordan Valley, Mujib dam, Wadi Rajil dam in the eastern desert of Jordan, and Muwaqqar dams in the eastern highlands of Jordan. The study reveals the significant role of ultraviolet radiation and bromide as limiting factors of eutrophication processes in the context of semiarid climate zones. The editors and contributing authors hope that this book will update the knowledge of eutrophication and its related fields on a global scale. This book will lead to new researches, methodologies, discussions, and efforts to overcome this global problem of eutrophication with minimum economic loss.

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