

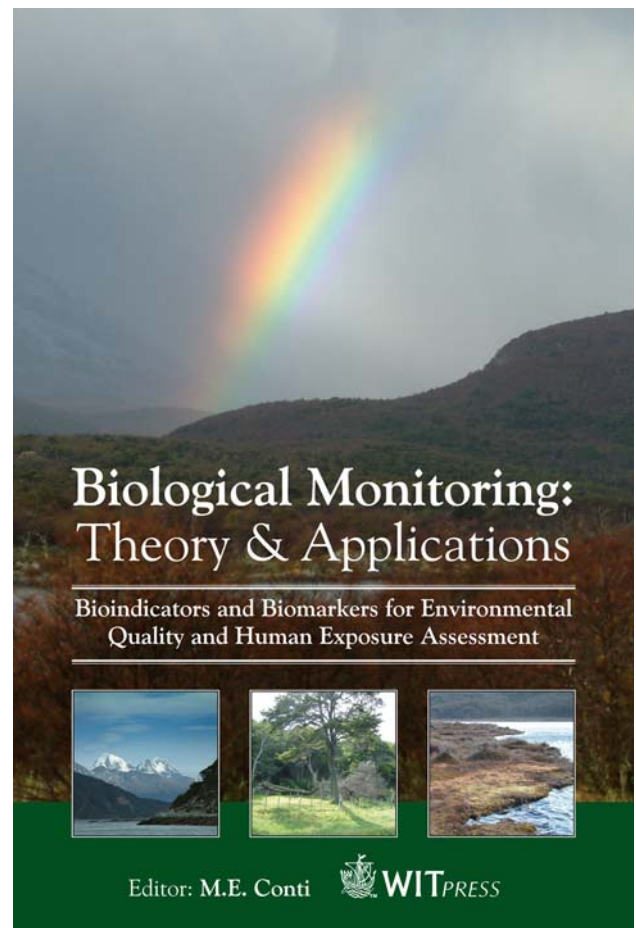
Book Review

Expanding the EcoHealth Toolkit

BIOLOGICAL MONITORING: THEORY AND APPLICATIONS, M.E. CONTI (EDITOR), 2008, SOUTHAMPTON, UK: WIT PRESS, 228 PP, ISBN: 978-1-84564-002-6

In recent years, increased concern about environmental pollution has been accompanied by attempts to develop health-relevant biomarkers of contaminants in the environment. The information emerging from a large number of scientific studies on industrial, agricultural, and urban environmental pollutants and their effects on human health has been alarming. Scientists, health care and public health experts believe it absolutely necessary to utilize all available sources of scientific and managerial knowledge, and to develop new tools and instruments that will help us assess the impact of pollutants on human health. One of the primary goals in this effort has been to develop reliable and cost-effective means of monitoring basal pollution levels in areas of interest.

Biological Monitoring: Theory and Applications has made a useful contribution to this end and offers an unique tool for both research and application. The book, edited by M.E. Conti and including contributions from four other authors, offers an overview of the present level of knowledge on biological monitoring and its application to evaluation of ecosystem quality and human health. The book consists of seven chapters. In the first chapter, the reader is introduced to both theoretical and practical aspects of biological monitoring, including the European Union's evolving legislative framework on chemicals. M.E. Conti carefully considers sampling problems and determination of background level as the fundamental points in determining the alteration of the environment and biota by pollutants. The second chapter is focused on mechanistic biomarkers for environmental monitoring. It is a well-



written overview of potential biomarker function, including molecular, cellular, organ, and macroorganism level responses to a wide range of pollutants. M.E. Conti points out that a single biomarker is often not sufficient. Rather, a battery of biomarkers for evaluation of the physiological integrity of diverse species present in a given ecosystem is generally necessary because of the need to assess the highest possible number of environmental contaminants.

The next three chapters deal with biomonitoring of the freshwater environment (Chapter 3), marine organisms as biomonitors (Chapter 4), and lichens as bioindicators of air pollution (Chapter 5). In these chapters, the reader will find methodological information of use to both laboratory and field scientists. As Chapters 3 and 4 are devoted to the water environment, the authors appropriately place their content in the context of the European Water Framework Directive (FWD) 2000/60 EC. Under the umbrella of the FWD, biological monitoring of aquatic communities, including mollusks, algae, macrophytes, and benthic macroinvertebrates has become a recommended priority. As Conti properly points out, chemical and bacteriological analyses cannot yield enough information on the whole of freshwater ecosystems, and thus bioindicators have become a key tool for defining the ecological status of water bodies. Readers will find valuable information on methods for analysis of macrobenthic communities, plant communities, and fish, including the Index of Biotic Integrity, as well as methods designed to look at whole river ecosystems. Chapter 4 covers marine organisms as biomonitors. Here the focus is on seaweeds, sea phanerogams, and mollusks as bioindicators of heavy metal contamination. As in the previous chapter, a diversity of species and genera are thoroughly described in view of their response to metals in solutions, dissolved and suspended contaminants, and in sediments, including recent deposits. Chapter 5 addresses both physiological and quantitative issues around using lichens to monitor diverse air pollutants, and highlights our need to increase our knowledge of lichens as bioindicators.

Chapter 6 covers the topic of human biomonitoring and application of molecular, cellular, and tissue biomarkers in occupational and non-occupational environments. In this well-written chapter by Alimonti and Mattei, readers will find a summary and synthesis of recent scientific studies on biomarkers of exposure, effect, and

susceptibility. A substantial part of this chapter is devoted to individual heavy metals, some organic pollutants, particularly PCBs, solvents, and pesticides. The authors did not attempt to write a comprehensive review of biomarkers for all known organic pollutants. However, the pollutants included in the chapter will offer the reader valuable models and applications for a diversity of pollutants and systems.

Finally, Chapter 7, by Conti and Mecozzi, provides a brief overview of multivariate statistical approaches to biomonitoring studies. Given the complex multivariate nature of exposures and the ways in which these are integrated biologically, both study design and data analysis deserve careful attention if biological monitoring studies are to become more important for research or policy action. The chapter is focused on multivariate analysis due to its indisputable advantage over univariate analysis in pattern recognition and in assessing the global contribution of all the variables present, while allowing one to identify statistical weights for each factor.

The strength of Conti's book is the well-balanced combination of theory and applications, supported by a solid list of references that make the book a valuable information resource for young scientists, faculty members, public health experts, and specialists in industry or government institutions dealing with the problem of environmental quality and health. The book is highly recommended also to university students of public health and related disciplines.

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