

Environmetrics for a data-rich world

Anders Grimvall

Swedish Institute for the Marine Environments and Linköping University, Sweden

e-mail: anders.grimvall@havsmiljoinstitutet.se

Massive datasets and detailed models of complex environmental systems must be compressed into simple statements and messages in order to be accessible to the public and decision-makers. Along with enormous advances in communication technologies, this sets the frame for environmetrics in a data-rich world. It is obvious to anyone that the Internet has revolutionized communication in practically all sectors of society. It is also generally recognized that developments in computer technology and computing greatly facilitate the handling of data and favour computer-intensive methods. Statistical tools such as the bootstrap and Markov chain Monte Carlo (MCMC) simulations have extended data analysis far beyond previous limits. Process-oriented models are run using higher resolution and a larger number of processes than could be imagined only a couple of decades ago. Nevertheless, it is often overlooked that advances in computer technology and computing have an even more profound impact on how science is performed. Instead of being limited by insufficient access to data, we are now frequently facing situations in which the major problem is to explore and summarize huge amounts of data or information. This calls for greater emphasis on visualization techniques, strategies for assessing data quality, and algorithms that can handle large datasets. In addition, we need information arenas where data from many different sources can be integrated, and producers and users of data can interact. Here, we shall use data and models from the marine sciences to illustrate the need for new perspectives on environmetrics and environmental monitoring. Special attention will be paid to eutrophication and acidification of marine environments, as well as the combined effect of trends in nutrient inputs and atmospheric CO₂ concentrations.