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Introduction to the Special Section on Statistics and the Environment

Modern environmental science is a broad discipline that concerns the measurement, analysis, modeling, interpretation and prediction of environmental phenomena. Not surprisingly, it generates highly diverse, complex data. Statisticians working with environmental issues are often challenged to develop (or redevelop!) novel quantitative methods to address the design, estimation and inferential issues such data present. (An interesting "white paper" that illustrates some of these points is available at http://www.stat.ohio-state.edu/~sses/WS2K/Reports/PositionPaper.pdf.)

Environmental science has progressed vigorously in the past decade or so, and the associated environmetric aspects have been impelled to keep pace with this progression. A solution determined for a particular problem in, say 1995, may find itself somewhat outmoded by 2004, and the cutting edge sometimes advances quite rapidly. This special Section of *Statistical Science* was designed to provide an introduction to a few such advances, given from the perspective of the underlying, motivating environmental issues. The selection varies with respect to the breadth of these issues: some are rather specific (such as Patil and Taillie's use of scan statistics in geospatial surveillance), while some are more broad in nature (such as Solow's overview of statistics in atmospheric science). As with most articles in the journal, the authors all provide a general background and review the pertinent literature; but, since the entire Section is already focused on one particular specialization, this appears to a lesser extent than is typical. Nonetheless, we hope this look at the current state of environmental statistics will not only give readers an appreciation for modern problems in the field, but also stimulate growth and development in these areas.

The following six articles do an extremely credible job of spanning the range of environmental statistics, looking at applications in seismology, climate change, remote sensing and disease clustering, using (among many other things) spatial statistics, scan statistics and kriging. We conclude the Section with a conversation with Abdel H. El-Shaarawi, one of the modern leaders of environmental statistics, and environmetrics in general.

As suggested above, in any modern, rapidly-evolving field methods found to be useful at a certain point in time often evolve into new ideas and approaches as the field itself evolves. So although we expect that much of what is presented in this special Section will mature and progress over time, we hope that the effort to present this collection will provide a source that itself enriches and evolves the science (and, indeed, the art) of environmental statistics.

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