

Center for Statistical Ecology and Environmental Statistics

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Center for Statistical Ecology and Environmental Statistics

Aims and Scope

The Center for Statistical Ecology and Environmental Statistics is located in the Department of Statistics of the Pennsylvania State University and was initiated under a cooperative agreement between the US National Oceanic and Atmospheric Administration (NOAA) and the Pennsylvania State University as a formal substitute for the earlier Penn State Program in Statistical Ecology and Environmental Statistics, in operation since 1969 [10]. The Center is the first of its kind in the nation and in the world, and enjoys a national and international reputation [1–4, 8, 9].

In collaboration with interested agencies, institutions, and projects, the Center has an ongoing program of research that integrates statistics, ecology, and the environment. The emphasis is on individual and collaborative research, training, and exposition on improving the quantification and communication of man's impact on the environment. Major interest also lies in statistical investigations of the impact of the environment on man.

Students participate in the Center as graduate research assistants, as interns at the Center, and sometimes also at the collaborating agencies' sites. The students benefit from ongoing miniseminars on individual collaborative research between interested university faculty and visiting scientists. These involvements usually lead to Ph.D. dissertations and M.S. term papers for students registered in statistics and related programs in environmental sciences. Sometimes they lead to more theoretical or more substantive investigations.

Broad research areas of the Center relate to statistical ecology (see **Ecological statistics**), environmental statistics (see **Environmetrics, overview**), and quantitative risk analysis (see **Risk assessment, quantitative**), with emphasis on mathematical statistics, statistical methodology, and data interpretation and improvement for future use. The adopted approach is to advance statistics for environment, ecology, and environmental health, and to advance environmental and ecological theory and practice using valid statistics.

Current research projects and activities include advanced raster map analysis, geospatial statistics, **geographic information systems** and **remote sensing**, accuracy assessment and change detection (see **Change, detecting**) using remote sensing data, innovative sampling and observational economy (see **Sampling, environmental**), ecological sampling and analysis (see **Habitat sampling**), environmental monitoring and assessment, integration of environmental data and information, **biodiversity** measurement and comparison, and superfund site characterization and evaluation under cooperative research agreements with the US **Environmental Protection Agency** (EPA) and the US National Science Foundation (NSF).

Logo

The Center's logo is shown in Figure 1. It visualizes the graphic concept of the Earth evolved in the cosmic order, and is set to establish the harmonious relationship between humankind and other ecological beings rendered from mathematical numerals. The gradation of spaces and the thickness of lines weave through each other into a structural harmony in totality.

Journal

The Center serves as the headquarters of a cross-disciplinary journal, *Environmental and Ecological*

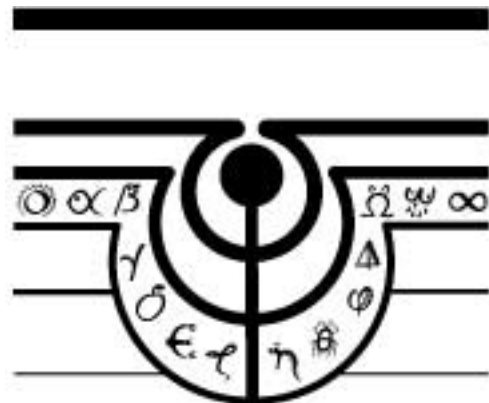


Figure 1 The logo of the Center for Statistical Ecology and Environmental Statistics

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Statistics, with Professor G.P. Patil as the founding Editor-in-Chief. A comprehensive group of one hundred environmental and ecological statisticians serves the journal [3, 4, 9] as its cross-disciplinary editorial group.

Publications

The Center has had a series of technical research publications that describe its contributions to statistics both in statistical and environmental practice. The research areas have included: species **abundance** models; chance mechanisms; logarithmic series; spatial statistics; **encountered data**; survey design and sampling; diversity and abundance; risk analysis; Chesapeake Bay stock assessment; stochastic models; ecological assessment with **generalized linear models** (GLIM) and **quasi-likelihood**; hazardous waste site characterization; **ranked set sampling**; composite sampling; **landscape ecology**; geospatial multiscale assessment; perspectives; bibliography; advanced raster map analysis; accuracy assessment and change detection analysis; **echelon analysis**; hierarchical transition matrix analysis; and **landscape fragmentation** profiles. The Center has been headquarters to the green series of fourteen thematic monograph publications on statistical ecology and to the blue series of fourteen thematic monograph publications on distributions in scientific work, published by Penn State University Press, International Cooperative Publishing House, and the Reidel Publishing Company. Additional monograph projects in preparation by the Center group include: *Macro-Environmental Statistics with Remote Sensing Data*, *A State of the Art Handbook*; *Pattern-Based Compression of Multiband Image Data for Landscape Analysis*; *Understanding Surfaces*; *Measuring Landscape Fragmentation and Landscape Comparison*; *Modeling and Simulation of Multicategorical Raster Maps*. For additional information, visit the web page at <http://www.stat.psu.edu/~gpp/>

Graduate Programs, Visitors, and Internships

The Center serves as a home base for a Graduate Program in Environmental Statistics in the Department of Statistics and for a Graduate Program in Statistical Ecology in the Graduate Ecology Program.

Over one hundred graduate students, interns and visitors have participated in the Center in one capacity or the other. For additional information, visit the websites at <http://www.stat.psu.edu/> and at <http://www.stat.psu.edu/~gpp/>. *Coenoses*, an international journal in population and community ecology, devoted a special issue in celebration of the 25-year period of Penn State statistical ecology and environmental statistics. The publications [5–7] may be particularly informative in this connection.

Outreach

The Center has been headquarters to several timely initiatives and activities involving various professional statistical, ecological and environmental organizations and government agencies, such as: the American Statistical Association, the **Ecological Society of America**, Intecol, the **International Biometric Society**, the International Statistical Institute, and the US Forest Service, EPA, NOAA, and NSF.

Major outreach initiatives and activities include:

1. Inception of Statistical Ecology, First International Symposium on Statistical Ecology (1969); Ford Foundation and US Forest Service.
2. Inception of International Statistical Ecology Program (1969–1984), International Association for Ecology, International Statistical Institute, and Biometric Society. Inception of Statistical Ecology Group, International Association for Ecology (1969).
3. First Advanced Institute on Statistical Ecology in the US (1972), National Science Foundation, Mathematical Social Sciences Board, and US Forest Service.
4. Satellite Program in Statistical Ecology (1977–1978), US, Italy, and Israel; NATO, US National Marine Fisheries Service, US EPA.
5. Multivariate Environmental Statistical Conference (1992) and *Handbook of Environmental Statistics* (1994), US Environmental Protection Agency.
6. Inception of Statistical Ecology Section, Ecological Society of America (1988).
7. Inception of **American Statistical Association, Section on Statistics and the Environment** (1990).
8. Inception of Distinguished Statistical Ecologist Awards, International Association for

- Ecology (1986). Inception of Distinguished Achievement Medals in Environmental Statistics, American Statistical Association (1993).
9. Ninth Lukacs Symposium on Frontiers of Environmental and Ecological Statistics. Twentieth Century Distinguished Service Awards in Statistical Ecology and Environmental Statistics at the Ninth Lukacs Symposium (1999). US Geological Survey.
 10. Special Issue of *Ecosystem Health* (1999, Volume 5, Number 4) devoted to environmental and ecological health assessment (*see Risk assessment, ecological*) of landscapes and watersheds with remote sensing data. First International Congress of Ecosystem Health, Initiative on Remote Sensing, Multiscale Ecological Assessment, and Regional Planning (1999).

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(*See also National Institute of Statistical Science (NISS), US; National Research Center for Statistics and the Environment*)

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