Learning statistics is not difficult, but the environmental professionals seldom get interested as the introductory course is largely a sterile examination of textbook data, usually from a situation of which they have no intimate knowledge or deep interest. Doing statistics on environmental problems can be like coaxing a stub born animal. Sometimes small steps, often separated by interval of frustration, are the only way to progress at all. Even when the data contains bountiful information, it may be discovered - in bits and at intervals.

There are many aspects of environmental problems: economic, political, psychological, medical, scientific and technical. When one is confronted with a new problem that involves the collection and analysis of data, two crucial questions are: How will using statistics help solving this problem? And, which techniques should be used? Many different subjective problems arise and many different statistical techniques exist, ranging from making simple plots of data to iterative model building and parameter estimation.

The objective of the proposed *Four Day Training Workshop on Environmental Statistics* is aimed at familiarizing the teaching community on the application of appropriate statistical techniques, exclusively to environmental systems. The faculty will demonstrate application of various probability and statistics techniques to environmental problems. The training would hopefully help in teaching the subject at their respective Institutions, in a structured manner. The main topics to be covered but not limited to:

1. **Environmental Problems, the Use and Misuse of Environmental Statistics: A Commentary:** A Brief Review of Statistics**,** Accuracy, Repeatability and Reproducibility, Outliers, Dixon Test, Violation of Environmental Quality.

2. **Plotting Data and Preliminary Analysis:** Smoothing and Seeing the Shape of a Statistical Distribution, Using Transformation such as Box Cox Power Transformation, finally Plotting an External Reference Distribution**,** Estimating Percentiles.

3. **Precision of Calculated Values:** Fundamentals of Process Control Charts, Limit of Detection, Linear Combination of Variables, Multiplicative Expressions, Error Suppression and Magnification, X Bar and Range Charts, MA and EWMA Charts

4. **Analyzing Censored Data:** Trimmed Mean, Winsorized Mean, Regression on Rankits, Cohen's MLE Method

5. **Significance Tests:** Paired/ Independent t Tests, Assessing the Difference of Proportions, Multiple Paired Comparison at k Averages, Tolerance Interval and Predicative Intervals

6. **Experimental Design, Sizing of Experiment:** OFAT Experiments, Type 2 Error, Factorial and Fractional Factorial Design, Stratified Sampling, etc.

7. **Analysis of Variance to Compare k Averages, Component of Variance and Multiple Factor Analysis of Variance**

8. **Correlation, Serial Correlation Regression and R^2**

9. **Introducing to Time Series Modeling/ Forecasting Time Series:** Autocorrelation Function, ARIMA Family of Time Series Models, The Principle of Parsimony*,* Figure of Merit

10. **Intervention Analysis:** The White Noise – Random Walk Models

11. **Multivariate Data Analysis**: PCA, Discriminant Analysis, Cluster Analysis, Factor Analysis like PMF (Positive Matrix Factorization)

12. **Other Topics:** Markov and Models and Application in Environment Management Systems, CMB (Chemical Mass Balance Technique), Bootstrap Method

Demonstration of Statistical Packages is an integral part of the Workshop.

PARTICIPANTS SELECTION CRITERIA

- Participants involved in teaching environmental engineering/ sciences at Post Graduate levels at the premier institutions and those involved in decision making from Industries are eligible to attend the workshop. The organizers will also consider limited seats for the research scholars and environmental professionals.
- Completed forms should be sent along with workshop fee of Rs.10,000/- for participants from India ($200 for those from other countries) payable in the name of **ESP 2011** to Prof. A.K. Dikshit, Coordinator ESP 2011, CESE, IIT Bombay, Powai Mumbai 400076.

IMPORTANT DATES

- The last date of receiving the completed application form for registration has been extended to December 15, 2011. On spot registration is also welcome. However, the course fee payable shall be Rs.12,000/-.
- Selected delegates will be informed by e-mail or fax as soon as application is received or latest by December 20, 2011.

The venue for the course will be the Conference Hall of Thadomal Shahani Engineering College, Bandra, Mumbai.

ORGANIZING COMMITTEE

Workshop Coordinators:	Prof. Anil Kumar Dikshit, CESE, IIT Bombay, Mumbai
	Prof. Raj Kumar Pathak, TSEC, Bandra, Mumbai
Committee Members:	Lokeshappa B.
	M A Shabiimam
	Mahesh Kumar Farejiya
	Nagabhushan Biliangadi
	Deepak Kulkani
	Kandarp Shivpuri

RESOURCE PERSONS

Faculty Chairperson	Ashok Deshpande, *Ph.D.,*
	Founding Chair: *Berkeley Initiative in Soft Computing (BISC)-Special Interest Group (SIG)-Environment Management Systems (EMS)*
	Guest Faculty: *University of California, Berkeley USA*
	Adjunct Professor: *College of Engineering Pune*
	Former Deputy Director: *NEERI Nagpur India*
Faculty	Dr. D. V. Raje, Nagpur
	Dr. Indrani Gupta, Mumbai
	Dr. D. Datta, Mumbai
	Dr. Anil Kumar Dikshit, IIT Bombay

TRAINING WORKSHOP
ON
ENVIRONMENTAL STATISTICS FOR PROFESSIONALS

December 27-30, 2011

Organized by:
Indian Institute of Technology Bombay and Thadomal Shani Engineering College Bombay

APPLICATION FORM FOR REGISTRATION

1   Name of participant: _____

2   Designation   _____

3   Qualification   _____Specialization_____

4   Age   _____

5   Full postal address   _____
     _____
     _____

6   Phone/Fax with STD code   Tel (O):_____
     (R):_____
     Fax (O):_____
     (R):_____

7   Email ID   _____

8   Accommodation required*   Yes/ No
(*Accommodation charges to be paid directly to the hotel)

9   Details of Registration Fee   DD/ Cheque no. _____ Date _____

     Amount:_____ Bank _____

Signature of Participant