Marine GIS applications

Two to five days (16-40 hours)

Overview

This course intends to give an in depth overview of the application of Geographic Information Systems (G.I.S.) mapping and analyses to marine environments. The course is organized in several independent modules to suite several custom training needs. It will cover subjects like marine GIS datasets and methods of data collection in the marine environment (Lidar, Multibeam, ROV, satellite data), calculation of benthic complexity parameters, habitat suitability modeling, marine protected areas systematic design, GIS methods for fisheries dynamics studies, mathematical interpolation of point data, GIS for tracking marine fauna and the ArcGIS Marine Data Model. Each module is completed by a hands-on tutorial in ArcGIS.. Each module is described into detail below.

Students Receive:

- Two "marine GIS" books, tutorial printed material and data CD, an evaluation copy of ArcGIS
- An understanding of Marine GIS concepts and applications
- Ability to apply the learned theoretical concepts to practical exercises using ArcGIS software and additional software modules

Audience

This course is for those who are interested to learn about state of the art marine GIS methods and applications.

Prerequisites and recommendations

Participants should know how to use windowing software and have at least knowledge of GIS as provided by the "*Introduction to ArcGIS 9.x part I" ESRI authorized* course. For those that are new to GIS an introduction to GIS module could be added to this course.

Modules description

- **Introduction to marine GIS applications (8 hours)**

This module provides basic concepts of marine GIS applications, a broad overview of all the others modules and some basic hands-on exercise like data on screen digitizing.

- **GIS datasets and methods of data collection in the marine environment (8 hours)**

This module will describe methods of data collection in coastal and marine environments like LIDAR, side-scan SONAR, Remote Operating Vehicles (ROV), Multibeam SONAR and their technical characteristics. It will also cover data derived from satellite image analysis like sea surface temperature (SST) and Ocean Colour. Tutorials will give practical examples on how to use data collected by these methods to study coastal changes, obtain bathymetry surfaces or map benthic habitats.

- **Benthic complexity modeling (5 hours)**

This module describes methods to calculate bathymetric position index, rugosity grids and other parameters to characterize the physical complexity of the seafloor. One of the applications of measuring complexity is marine resources conservation that involves concepts of biodiversity, fish-harvesting practices etc. Hard-bottom regions of the marine ecosystem provide essential habitat for a wide variety of marine species and benthic complexity is a known contributing factor to measuring the likelihood of multiple species habitation. A tutorial on the ArcGIS extension "Benthic Terrain Modeler" is included.

- **ArcGIS marine data model (4 hours)**

Learn to use the geodatabase template developed for marine GIS users. In this module, you will use the Schema Wizard in ArcGIS to load the Arc Marine data model schema and then modify it to suit your needs by loading data and creating relationships between tables. The purpose of this tutorial is to introduce you to the ESRI geodatabase in general and the Arc Marine Data Model in particular.

- **Habitat suitability modeling (3 hours)**

The tutorial will review the steps involved in a suitability assessment of marine fauna habitats and how to conduct an analysis using the ArcGIS Spatial Analyst extension.

- **Marine protected areas network systematic design (5 hours)**

Systematic network design aims to achieve a number of established conservation targets through the implementation of a system of Protected Areas. It also aims to minimize the cost associated to identified social, political and economical factors. The basic steps involve the identification of the conservation features and the establishment of conservation targets for each feature. The designer divides the managed area in a grid of planning units and tries to identify which combination of units will lead to the best conservation effort by meeting the targets at the minimum cost. Political, social and economic factor can be included to obtain complex cost estimations. Learn the basic of Marxan algorithm and to use it through the ArcGIS application PANDA (Protected Areas Network Design Application).

- **GIS methods for fisheries dynamics studies (3 hours)**

Learn how to use GIS and Spatial analysis to analyze and display the entity, distribution and success of fisheries activities. Use density analysis and map algebra to calculate temporal and spatial variations of fishing pressure and Catch Per Unit of Effort.

- **Using Tracking Analyst for ArcGIS to track marine fauna (4 hours)**

This module gives an overview on how to handle temporal data (real-time and from disk) generated by marine fauna radio-tracking in ArcMap and ArcCatalog using the ArcGIS extension Tracking Analyst.

- **Suggested additional course: ArcGIS 9.x Spatial Analyst extension**

Price

350 € per day per person (1 day = 8 hours)

Further Information

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