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Models, TMDL and the U.S Clean Water Act

A TMDL looks at all aspects of a specific pollutant or impairment of a water body to understand the link between the various sources and their effects.

In the past few years, a formerly all but ignored program established in section 303(d) of the **Clean Water Act,** the **Total Maximum Daily Load (TMDL)** determination (40 CFR Part 130), has come to permeate almost every aspect of surface water quality standards and wastewater permitting throughout the United Stated. The TMDL program is part of the overall strategy of the EPA to identify all impaired (polluted) surface water, determine the cause of the pollution and to restore those waters to an appropriate water quality standard. The regulation designates pollution source reduction on a state by state basis which must be reviewed and accepted by the EPA.

A TMDL looks at all aspects of a specific pollutant or impairment of a water body to understand the link between the various sources and their effects. For example, a water body may have been determined to have fecal coliform concentrations in excess of state regulations. This will obviously impair the water quality and restrictions may be put in place (e.g. swimming and fishing are no longer allowed). The TMDL will identify the source and determine the causal links between the source load and in-stream concentration. The process is designed to evaluate and determine what source reductions are necessary to achieve the designated water quality standard. This process determines the total maximum daily load, including all sources, that the water body can handle and still be within regulation. This then allows industry, wastewater treatment facilities, regulators and other interested parties to quantitatively assess and alter permitted effluent limits accordingly.

The important differences between a TMDL program and a traditional waste load allocation (WLA) for NPDES permitting are that the total load is science-based (predicted), not dependent on "Best Available Technology". All of the potential sources of a pollutant are considered and direct input from interested parties, (stakeholders) is solicited. The sources include the point and non-point sources referred to as the WLA and load allocation (LA), respectively. Also included is a margin of safety (MOS) for the predicted assimilative capacity of the water body. It is clear that the accuracy of the predictions can be of great importance to industries with permitted limits on their effluent. With a greater and verifiable accuracy of prediction, the MOS portion of the TMDL can be reduced, thereby increasing the allowance for the WLA and LA portions. With the new generation of computer models and the increasing speed of the hardware, the required accuracy and comprehensiveness for a fully developed TMDL becomes a possibility.

ASA is participating in a number of these TMDL processes that combine a fully deterministic modeling approach in concert with stakeholder involvement in the TMDL process. For example, in Rhode Island ASA is combining our WQMAP model system and field data for Narragansett Bay. The Department of Environmental Management (RIDEM) will use these tools and data to predict hydrodynamic circulation, pollutant transport and water quality for the bay. The bay receives both point source and non-point source loads of fecal coliforms and nutrients. This TMDL process will involve all stakeholders in the development of "common-sense" regulations and permit limits that are based on accurate, science-based results that will ultimately lead to improved water quality in the bay.

ASA Develops Relational Database for Site Remediation Work

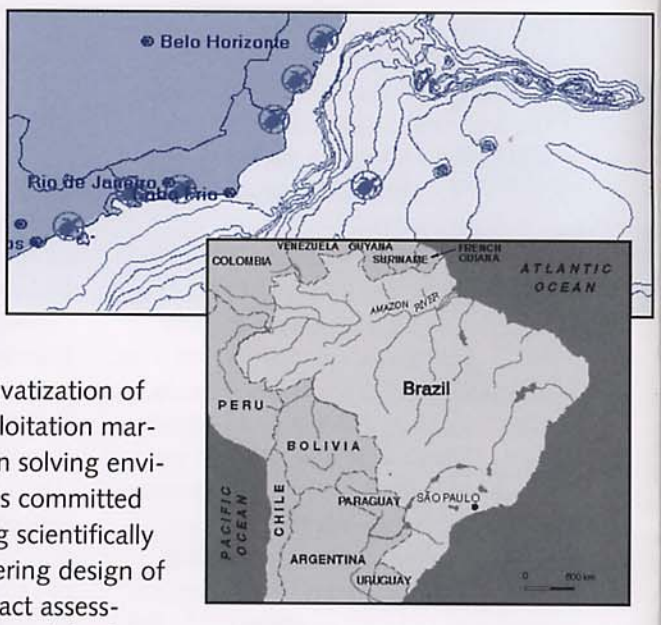
A single database can manage sampling, chemical analysis, and all other aspects of site remediation.

Traditionally, data associated with site remediation has been collected using a variety of methods and stored in a variety of formats, making data analysis and synthesis a challenge. ASA has developed a relational database software application that can be used in all phases of remediation work, from data collection, to analytical analysis, to data synthesis to archiving. The database system is designed to consolidate all of the information into a single application used at many levels of the organization. The first phase of the work focused on designing a database structure and interface to accommodate data collected during field sampling at the site. Data describing samples collected in the field had always been entered onto paper forms so the goal was to design an interface that mimics the paper format, but stores the data in a relational database. Once the sample collection interface was complete, we worked with the laboratories doing the analysis on the samples to establish data formats and data exchange protocols for transferring the electronic chain of custody data to the lab. The data design had to be generic enough to meet the needs of multiple laboratories, making it easy for each lab to generate analytical data in the requested format, yet be specific enough to meet the needs of the project managers relying on the analytical data to direct the remediation. The third and final piece of the work was to develop data queries and reports so the data are easily accessed and interpreted. With this final part of the system in place, the data management loop is closed and all information generated in the sampling, chemical analysis and remediation management is maintained in one relational database system.

In the near future the system will be integrated with GPS hardware and ArcView™ GIS software to provide spatial of the analytical data. Sampling procedures will include the use of differential GPS to allow field workers to enter sample locations directly into the database when the sample is taken so that each sample is precisely located. Spatial analysis of the data will then be possible using ArcView™, giving workers the ability to discern the location and extent of the contamination at the site and effect a more efficient clean up. The future also holds changes for the users of the new system as they learn new ways to extract, manipulate and analyze data.

ASATM Brasil: ASA's new office in Brazil

ASA is pleased to announce a new office in Brazil. ASATM Brasil is a joint-venture of ASA with Applied Technology and Management (ATM), and was created to serve our present customers and new clients in Brazil and other South American countries. The new office, located in Sao Paulo, is run by Eduardo A. Yassuda, Director of Operations. Eduardo is Brazilian and received his Ph.D. in Coastal & Oceanographic Engineering from the University of Florida. He has over 10 years of experience in modeling coastal and estuarine processes.



Despite some economic fluctuations, characteristic of developing countries, the Brazilian market is considered among the most important in Latin America, especially in the environmental technology sector. The privatization of the infrastructure services combined with the opening of the petroleum exploitation market have created a high demand for engineering companies with expertise in solving environmental problems with state-of-the-science technologies. ASATM Brasil is committed to assist both governmental agencies and private sector clients in developing scientifically and technically sound solutions to environmental projects, including engineering design of marine structures, coastal resort developments, marinas, environmental impact assessment of proposed infrastructure developments (e.g., outfalls, bridges, ports, and dredging operations), contingency planning, risk assessment, and emergency spill response.

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personnel

Craig Swanson spoke about Circulation and Pollutant Transport in Narragansett Bay at Narragansett Bay 2000, a symposium sponsored by Rhode Island Sea Grant. Joint authors included **Daniel Mendelsohn, Henry Rines, Deborah French, Tatsu Isaji** and **Matthew Ward.** The symposium, held 19 and 20 January 2000, focused on recent and ongoing research in Narragansett Bay and included speakers from area universities as well as state and federal agencies.

Craig Swanson spoke on 10 February 2000 at the University of Rhode Island Ocean Engineering Seminar Series. His topic was Observations of Thermal Plume Dynamics in Mt. Hope Bay and summarized some of the unusual characteristics of the warm water plume from the Brayton Point electrical generating station observed from an extensive field study ASA conducted.

Craig Swanson and **Dan Mendelsohn** briefed a group of Vermont state agencies on 15 February 2000 about a series of ASA studies looking at the effects of the Swanton-Alburg bridge that crosses Mississquoi Bay on Lake Champlain. The bridge is to be replaced and concern has been raised on how best to design the new bridge to minimize environmental impacts to the shoreline, bay waters and biota in the area.

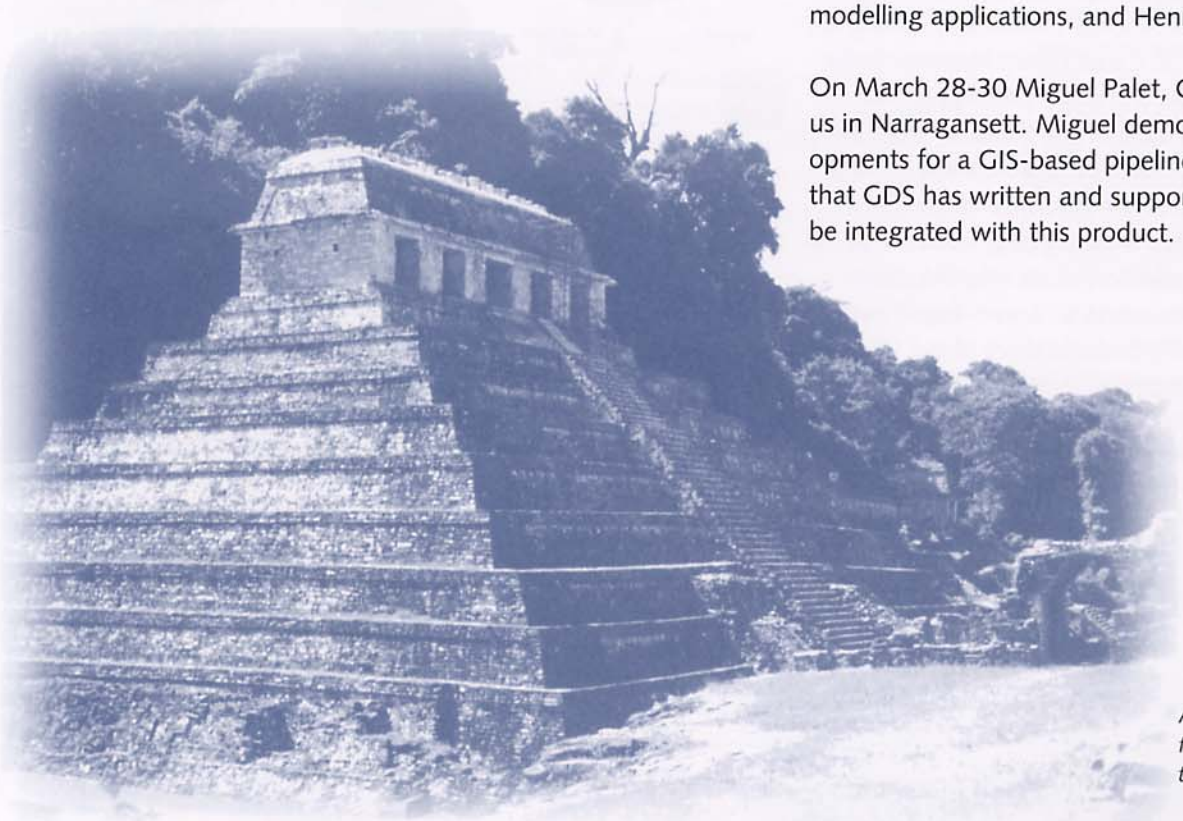
Deb & her husband Tom enjoying sunny skiing in Colorado.

On 20 March **Deborah French** presented a seminar on oil spill fates and impact assessment modeling to the Institut francais de recherche pour l'exploration de la mer (IFREMER) in Brest, France. The waters near Brest were impacted by the Erika spill in December 1999. The discussion focused on how ASA's SIMAP model could address questions regarding the oil's fate and impact, and how it could be used in ecological risk assessment and contingency planning for future spills.

Eoin Howlett delivered OILMAP/Worldwide to Chevron's offices in New Orleans, February 23/24. Training on OILMAP was provided with special focus on integrating existing GIS data for the Gulf of Mexico and transition from WOSM databases.

In January and February **Dan Mendelsohn** and **Henry Rines** each spent a week in Cd. del Carmen with Miguel Palet, GDS de Mexico in training courses for PEMEX Northeast and Southwest Regions. Dan trained the staff on WQMAP modelling applications, and Henry on our SIMAP software.

On March 28-30 Miguel Palet, GDS de Mexico visited with us in Narragansett. Miguel demonstrated their latest developments for a GIS-based pipeline and facilities application that GDS has written and supports for PEMEX. Oilmap will be integrated with this product.



ASA staff got a chance to visit a famous Mayan temple during their recent visit to Mexico.

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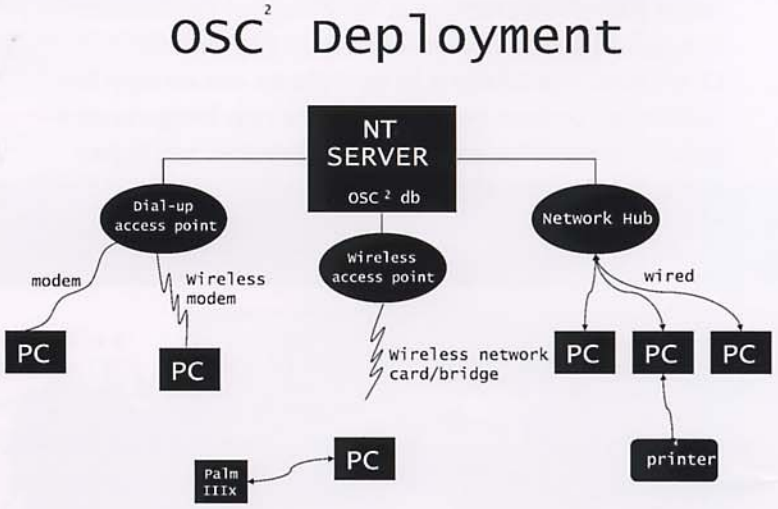
Software Training for the US Coast Guard

ASA has developed a prototype software application, OSC², for oil spill command and control. OSC² is used by the US Coast Guard to manage oil spill response resources using the Incident Command System (ICS). ICS provides the coordination and organizational structure required to conduct an effective emergency response when people and resources are brought together from different companies, agencies and groups. ASA recently conducted training sessions for members of the US Coast Guard National Strike Force in the use of the OSC² software prototype. The training was conducted at each of the National Strike Force locations – Atlantic, Gulf of Mexico and Pacific – to help Strike Team members maintain proficiency in the use of OSC². The training coincides with ongoing software development that includes the addition of an Internet client/server capability for remote access to a web-based database via cellular modem. To find out more about OSC², you can contact Chris Galagan at: chris@appsci.com.



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