Directions Magazine

Turkish Government Bases National Emergency Response System on GIS Technology

By Jim Baumann
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August 17, 1999 will forever remain etched in the minds of the Turkish people.That day, an earthquake measuring 7.4 on the Richter scale struck western Turkey, leaving more than 17,000 dead, 44,000 injured, and 320,000 homes and businesses lost.In addition, more than 300,000 people became instantly homeless from a disaster that caused more than 3 billion dollars in damage.

This catastrophic event was surpassed only once in the 100 years that Turkey has been recording earthquake data.On December 27, 1939 a 7.9 quake struck, killing nearly 33,000 people and damaging 117,000 buildings.

These are not, however, isolated incidents.According to Turkish seismic records, 66 major earthquakes (5.5 or greater on the Richter scale) have struck Turkey during the past 100 years, almost half of which were 6.5 or greater.Scientists who study the causes of earthquakes say that there are so many deadly tremblers in this region because it is located at a point, known as the Anatolia fault, where several of the earth's tectonic plates meet.

In addition to the ever-present danger of living in a high-risk earthquake zone, Turks are also vulnerable to other common natural and manmade disasters, such as fire, flood, and, of course, terrorism.

To develop an integrated response to potential national disasters, the Republic of Turkey tasked its Ministry of Environment, a longtime user of GIS technology, with developing a national emergency response center, designated as the Emergency Center Project (ECP).

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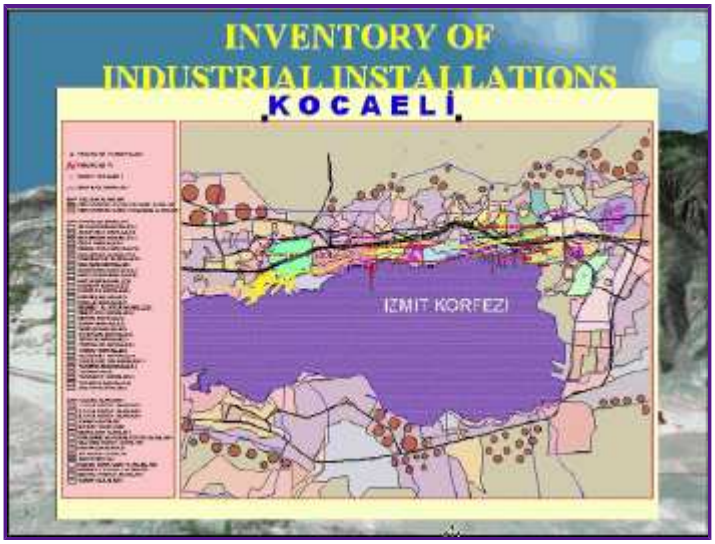
The Ministry turned to ISLEM, ESRI's software distributor and GIS integrator in Turkey for technical help with the project.It was decided to initially implement a pilot project in the Kocaeli and Yalova Provinces.



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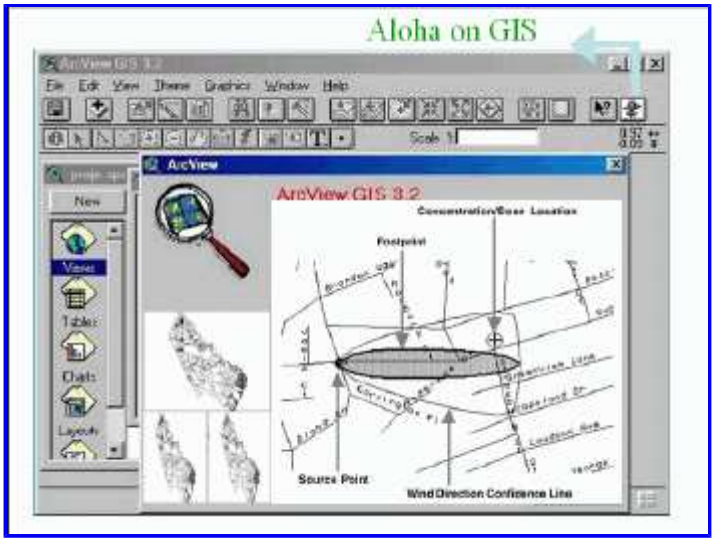
According to Yalcin Akkas, Head, Section of Industrial Accidents Control, Ministry of Environment and Forestry, the ECP was developed to "analyze the affects of accidents and natural disasters on Turkey's strategic commercial and industrial installations."

After extensive study, it was decided to integrate GIS-based environmental predictive models into the ECP system to provide the necessary analytic capabilities.

The team chose two models to incorporate into the ECP.One is the Areal Locations of Hazardous Atmospheres (ALOHA), developed by Environmental Software and Services (ESS) of Gumpoldskirchen, Austria.ALOHA is an environmental model used to simulate the dispersion of specific chemicals in the atmosphere.The other, Risk Management Plan (RMP-HAZMAT) from the U.S.Environmental Protection Agency, creates dispersion models for land- and water-based spills. These models, which require atmospheric and geographic data input, can predict with great accuracy the affected areas in the event of a large industrial accident.



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To test and refine the models, environmental studies on two factories that were severely damaged in the August 1999 earthquake were conducted.Accident reports, environmental pollution assessments, and mitigation studies on AKSA, a synthetic fiber and textile factory, and Tupras, a petroleum refinery, were analyzed in detail to help generate model parameters.

In addition, a wide variety of data was processed to generate the geospatial database necessary for the ECP. The data includes soil and land capability maps (1:100,000 scale), topographic maps (1:25,000 scale), Landsat TM Images, SPOT PAN images, aerial photography, and a digital elevation model.Also included was information from Turkey's Industrial Site Establishment Information Questionnaire, which details production and consumption amounts, the location of hazardous materials on-site, NACE Codes, CASNOs of chemical agents, and an industrial site location map at a scale of 1:25,000.

The data for the database was processed using ERDAS's Imagine, the ArcView Image Analysis extension, a collaborative effort between ERDAS and ESRI, and ESRI's ArcInfo, 3D Analyst, Spatial Analyst, and ArcView software.

Concludes Akkas, "Phase One of the Emergency Center Project is now complete.In the next phase, we will set up an ArcSDE server to manage the data with ArcIMS to allow the distribution of our National Environmentally Hazardous Industries database via the Web, which will allow our emergency response agencies to react more quickly in times of disaster."
