GIS CGRP

Overview

The Los Alamos National Laboratory's Cerro Grande Rehabilitation Project (CGRP) involves many subprojects. One of them is a geographic information system for electronically storing and displaying geographically-related data about the fire's effects. The data are used for research, planning, emergency response, and for informing the public. They are available on the internal Lab computer network, and parts are also available via our external web site.

These web sites provide access to the repository of geospatial data relating to the May 2000 Cerro Grande Fire. This repository includes data generated by the Burned Area Emergency Rehabilitation (BAER) Team during and shortly after the fire as well as data resulting from the ongoing environmental monitoring programs related to the fire. These data are available in two forms: (i) direct download of individual geospatial files from a data catalog and (ii) analysis and visualization of multiple data files within a web-based geographical information system (GIS). The GIS can be accessed, within the Lab, via an internet map server (IMS) capability.

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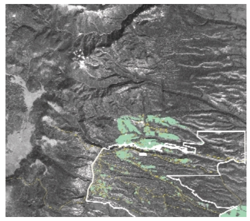
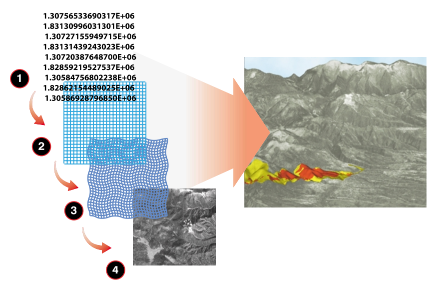
Reason for GIS



As a result of the May 2000 Cerro Grande Fire, an immense amount of data are being generated in regard to the fire's complex, ongoing effects on soils, water, vegetation, structures, and property. A geographic information system can show the time and spatial relationships of these datasets, allowing changes caused by the fire to be analyzed and visualized. As more and more datasets are added, the number of ways to cross-compare them increase dramatically.

The GIS utilizes computer technology that makes these specialized data available to Laboratory and external users via a simple web interface. The intent is to provide a Laboratory resource for consolidating important fire-related data. This will assist scientists and emergency managers in anticipating long-term forest fire effects and in dealing with future emergencies in the Los Alamos area.

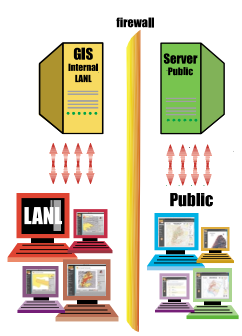
How it Works



A GIS organizes information associated with specific geographic locations into a database that can be queried by topic and location. The results can be displayed as maps with overlays of various kinds of information, allowing the spatial relationship of the data to be seen.

For example, highly detailed topographic data and fine-resolution remote sensing photographs, each shown as an array of tiny grid squares or pixels, necessarily contain huge amounts of information. When combined by the GIS, these two kinds of files can be scaled, aligned and merged to create a realistic 3-dimensional image, essentially a photograph draped over a digital terrain model. Such a computerized visualization can be colored, annotated with text, overlaid with information generated from other databases, seen from various viewpoints, and even animated so that it tilts and rotates. A GIS needs fast computers able to handle the large amounts of data. The data storage capacity of this system is 2.3 terabytes of information. A terabyte (TB) is a million megabytes (MB).

Accessing the Data



By using web links, remotely located smaller computers can easily access the powerful computers and complex software required for such work. The GIS has therefore been designed to respond to queries from users' desktop computers for specific datasets and mapping functions, whether or not they have GIS software themselves. For security and access control, data can be placed on an internal Laboratory computer net or on an external, public access net. This separation permits Laboratory researchers to have access to full GIS functions and detailed data, but provides some GIS functions and browsing of GIS output as well as some input by public users.

Benefits

Researchers can combine data in new ways to analyze patterns and trends not evident in separate databases. Analyses can lead to predictive tools for hazards, such as storm runoff patterns from burned areas, and flood threats in watersheds. Vegetation changes can be monitored and could be combined with burn severity data, rainfall data, and elevation to anticipate regrowth patterns and areas of possible future fire threat. The GIS enables data to be extracted, combined in new ways, and displayed as desired by the user. Analytical results of researchers' computer models can also be stored and displayed, such as predictions of soil transport caused by runoff. Computer models and GIS can thus provide valuable planning tools for managers and other officials.

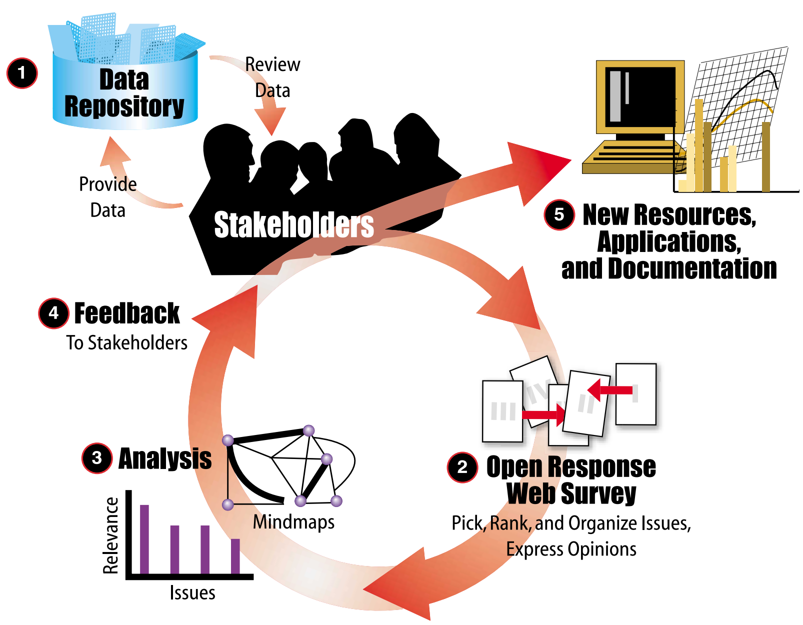
The public interest is well served by having GIS fire and post-fire data available to help us all to understand the natural recovery processes underway and the long-term effects of the fire.

Feedback and Consensus Building

The CGRP-GIS project does not provide information in a vacuum. The suggestions, needs, and contributions from the project stakeholders (data providers and GIS users) are extremely important to the success and the value of the project.

The stakeholder feedback tool harnesses the collective intelligence of all involved stakeholders by identifying the most important issues, how they are related, and how they relate to the different stakeholders. It facilitates consensus building through a clarification of both agreements and conflicts. Further, it gives CGRP-GIS personnel an easy way to document decisions and define new directions for application development.

In the first step, stakeholders individually review online databases, maps (GIS), and other relevant information. Where possible, stakeholders provide additional information to the data repository for review by others. Next, in Step 2, stakeholders pick, rank, and organize issues relevant to the process and express opinions. This process is made more efficient by an online (Web-based), open-response survey that allows freely typed input to questions about important issues in the project. Individuals are given the opportunity to describe new issues as well as to rank those provided in the survey. These open-response surveys are synthesized and analyzed in step 3 to identify areas of conflict and consensus. In Step 4 the results of the analyses are posted on the CGRP-GIS web site for feedback to individual stakeholders. Steps 2, 3 and 4 can be repeated as the stakeholder community reacts to areas of conflict and agreement and individuals modify their positions. Finally, in Step 5, newly defined needs are met by acquiring additional data or developing of new software applications to help the stakeholders make better-informed decisions.



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