

Project Abstract

The USGS Landslide Hazards Team is tasked with identifying the conditions that can lead to debris flows from recently burned basins in southern California. A database of information on rainfall, basin conditions and storm response was compiled for this analysis from a variety of sources, including rain gages, field studies, digital elevation models (DEMs), burn severity mapping and soil databases. One of the challenges of this project was identifying the best source of data to quantify the morphologic condition of the study basins. ARCGis was the main program used to gather this information, however it could not provide use with all of the data we needed. For this project, we explored the use of three supplemental programs that provide different measures of gradient distributions within a basin and of drainage structure to identify the most useful suite of potential variables and to assess relative ease of use. We evaluated the public domain databases of StreamStats and EDNA (Elevation Derivatives for National Applications) and the privately-marketed Rivertools. Streamstats is a web based program that can provide measures of basin area, gradient, drainage area, rock type, available water content, and many other useful basin and stream flow characteristics derived from 30-m DEMs. Unfortunately, the data is not presently complete for the state of California. Test maps were created evaluate the practical application of Streamstats. The program was easy to access and the information gathered was useful. However the basin delineation tool was imprecise and hard to manually edit. This caused problems with the accuracy of the data because the outlines of the delineated basins did not match those needed. EDNA also provides access to similar hydrologic and slope data, and can be based on either a 10-m or 30-m DEM. EDNA was very difficult to use and navigate. It took a long time to figure out how, but eventually maps were created. Unfortunately there was no way to gather any values from them without approval to access internal files by the administrators of the program. Overall, this process was slow and did not turn out desirable results. Rivertools is used to identify watersheds and drainage pathways within basins. Importing a DEM is very easy and any resolution can be imported, once done there is a plethora of information available, including different measures of area, slope, drainage density, and bifurcation ratio. Due to its ease of use and the variety of available information, I believe Rivertools is a good resource for data compilation for this study. By using both ARCGis and Rivertools we were able to successfully create a complete database that can be used for analyzing debris flow hazards in the southern California area.