

PROJECTING GLOBAL RASTER DATABASES

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The use of global raster databases for environmental analysis and modeling has been limited by the availability of high resolution data until recent database efforts resulted in 30 arc sec resolution global datasets such as LandScan, Gtopo30, and global land cover data. Recent research has demonstrated that projection of these data from geographic coordinates to a plane projection or transformation from one plane projection to another can result in significant loss of accuracy for raster data. A number of specific problems have been identified including pixel loss and pixel gain for categorical datasets and errors dependent on resolution, latitude and projection type. This research examines the problem of projecting global raster datasets in detail with four specific approaches, all of which have yielded substantive results. First, to aid in the proper use of map projection, a decision support system (DSS) for map projection selection has been developed. The design of the DSS, which will be implemented on the WWW, includes specific decision selections for raster data of various resolutions and extents as well as a tutorial for users. The second focus of the research is examining dynamic projection in which each raster line is projected in such a way as to exactly maintain the area covered on the spherical earth. The third approach has developed a scale factor error model which can be applied directly to the projected raster data. Finally, since much of the error resulting from transformation of categorical data occurs in resampling, a new categorical resampling algorithm has been developed. This algorithm offers the user a choice of methods to determine the final look of the resampled image.