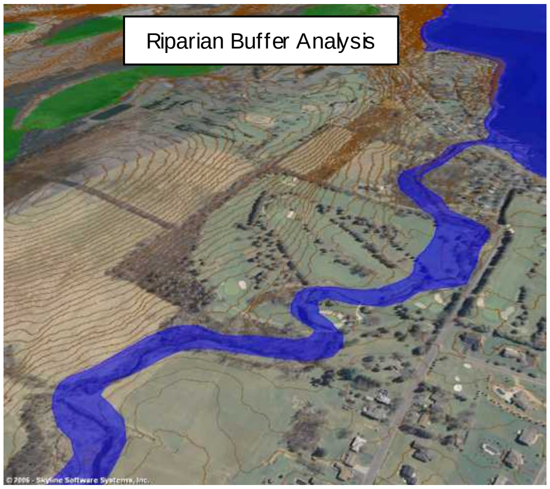
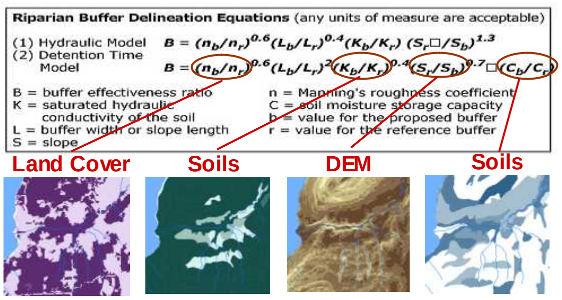
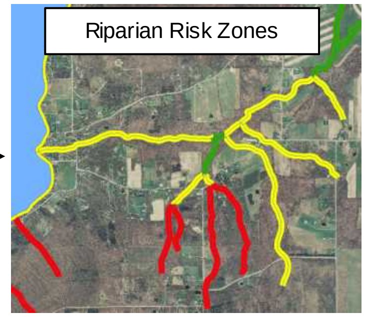
LiDAR Elevation Data

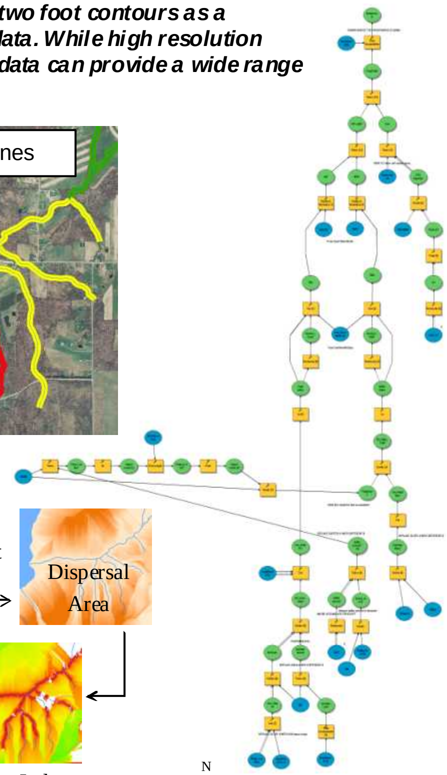
Beyond Contours - LiDAR Data in Action

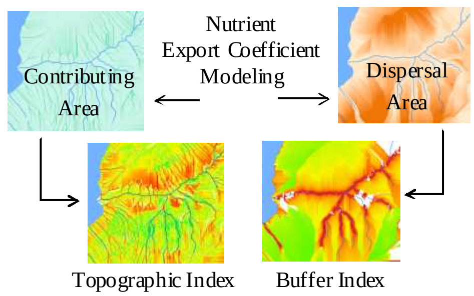
Most people cite the need for one or two foot contours as a fundamental justification for LiDAR data. While high resolution contour data is a huge asset, LiDAR data can provide a wide range of additional benefits



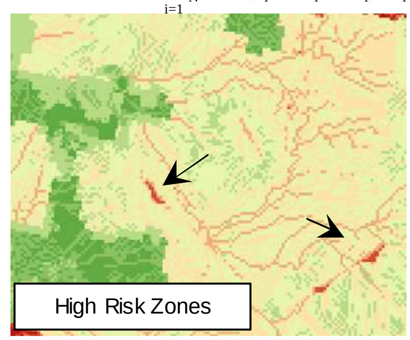




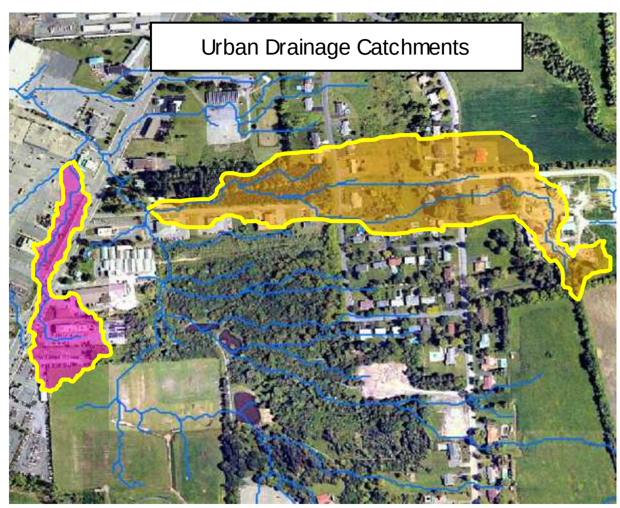




$$L_N = \sum_{i=1}^{N} [(E_i * NTI_i * NBI_i) * A_i]$$



Raster based modeling is entirely limited by the resolution and accuracy of the underlying topographic data. LiDAR data makes raster based modeling a reality. No longer is GIS desktop topographic analysis limited to traditional USGS topographic data, derived at 1:24,000 with cell sizes of either 10 or 30 meters. Now you can develop projects based on 1m cells, soon approaching 1ft cells, or the equivalent resolution of most aerial photography! The **integration of high resolution digital elevation models and aerial photography** is fast becoming a framework part of your enterprise GIS system. This is fully digital cell based modeling. Modern GIS packages make it a pretty straight forward task to model mathematical equations and complex relationships in your GIS. Examples include using **RUSLE equations** for runoff and erosion, **Riparian Buffer analysis** and **Variable Source Area Hydrology** for water quality risk assessment, and fusion with photography for mapping **tree canopy** and **impervious surfaces**.



It Isn't Just for Contours Anymore!

The LiDAR Myth:

Practical Considerations for using LiDAR data

Void Areas **exist in your LiDAR data. Do you know where they are?**
When viewing a “bare earth” surface, the buildings and trees have been essentially removed from the data, creating “voids” where there are no points representing the ground surface. The larger these void areas are, the less confidence you have in the accuracy of the ground surface in that area. Software programs interpolate across these void areas to derive seamless and cartographically pleasing terrain surfaces and contour maps. Once these derived products are created, you may never be able to tell where void areas may have existed in your data. GroundPoint recommends as standard practice to generate void area maps for every project. These can be used in qualifying the surface models and contours that you might use or distribute with the LiDAR data, and for assessing project level impacts. In addition, void areas are not normally distributed uniformly across an entire collection area. As a result, some areas will potentially have a higher or lower average point spacing (point density) relative to the entire collection. The point spacing specifications published as part of any LiDAR collection are averaged over the entire area, including all void areas, while local point densities within the collection may vary considerably as a result.

Engineers and surveyors need the *points and the control*, not just the contours…. Many LiDAR deliveries are poorly documented when it comes to both the horizontal and vertical control used to post process the data and assign coordinate values. For an engineer or a sureyor to be able to use the resulting LiDAR data and to certify products they create based on the LiDAR data, they need to have adequate documentation from the collection vendor on the control network used, the methods employed to establish the control and, of course, the resulting survey control data.

The *point cloud* may be more valuable than the ground, but *is it classified*?
Most deliveries come with ground points classified, but all the remaining points remain in an unclassified or non-ground state. GroundPoint will further classify the points in your LAS file in accordance with the latest ASPRS standard LAS file classification schema, to include buildings, trees, and other artifacts. The quality of the point classification is a critical part of ensuring the greatest success and value in many advanced LiDAR applications.

Intensity data **is great, but be careful...**
LiDAR intensity data can appear similar to a panchromatic (black and white) image when displayed. However, the actual intensity values tend to range widely, often differing from flight line to flight line. When displayed, the intensity values, along with a visual interpretation of pattern, shape and texture, can be immensely valuable for troubleshooting feature and land cover identification issues. Be careful in using the absolute values of the intensity data across the entire collection without some kind of normalization or other method of accounting for the shifting ranges.

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