Digital Elevation Models (DEMs) are being increasingly used in hydrology (Wilson and Gallant, 2000). The rapid ongoing improvement of available DEM data is due to the evolution of DEM acquisition techniques such as LiDAR (Light Detection And Ranging) that are producing high resolution DEM data. Under certain circumstances (low resolution of the DEM), softwares (Global Mapper, ArcGis) can moderately help to upscale the resolution of DEM. Researchers actually stand at a threshold of improvement in surface topography precision that provides opportunities and computing challenges. This situation is also driven by the available performance in personal computers with the capability to speedily process DEM data and use topographic attributes extracted from DEMs in hydrology models (Tarboton, 1997).

Topography defines watersheds which are fundamentally the most basic hydrologic landscape elements (runoff characteristics). In this project, the derived topographic quantities are coupled to a hydrologic model using the Soil Conservation Method SCS (1978, 1968) that defined rainfall-runoff (part of precipitation that flows in streams, lakes, wetlands and rivers). The applied method determines accumulation areas and contributes to surface water bodies assessment to potential contamination by ammunition residues from range training areas (RTA).

Consequently, this work is focused on the analysis of surface water quality in terms of contamination by ammunition residues. The methodology used in this project is based on the Soil Conservation Service (1973) "A Method for Estimating Volume and Rate of Runoff in Small Watersheds," Technical Paper No. 149, USDA-SCS, Washington, D.C. and the literature cited above.

The following steps were taken to develop the proposed methodology:

1. DEM Preprocessing
2. Hydrologic Modeling
3. Vulnerability Analysis
4. Conclusion

DEM Preprocessing
- Pit Removal (Filling)
- Flow Direction (DEM)
- Landscape Information

Hydrologic Modeling
- Runoff
- Rainfall-Runoff
- Index

Vulnerability Analysis
- Flow Accumulation
- Index
- High: 6 (Permanent streams)
- Low: 2 (Intermittent streams)
- Targets
- Firing Position
- Surface Water Analyses

Legend

Conclusion

Topographic attributes extracted from DEMs are useful in hydrologic modeling. DEM quality is important for the development of surface water bodies assessment mapping. Errors from the DEM may bias the surface flow direction and change slightly the local outputs of the hydrologic model. However, the provided map may help to decide if the location of targets and impact areas need to be moved in relationship to surface water quality. However, aquifer vulnerability must also be considered to have a more integrated management tool.

References