

GIS in Natural Resources and Agriculture

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Often Natural Resources and Production Agriculture are viewed as similar endeavors where forests are just a larger form of a crop— hence the U.S. Forest Service is in the Department of Agriculture. However their modern expressions identify significant differences in their respective motivations, goals, decision environments, technological approaches and applications. Very generally speaking from a GIS perspective, agricultural applications tend to be tightly focused on stewardship and economics at the field level, whereas natural resource applications tend to focus more on and ecology and environmental impacts at the watershed and regional levels. NR was an early adopter of geospatial technology as a direct outgrowth of its mapping/inventory legacy for automated cartography and geoquery of an extended resource base. Ag, on the other hand, had little use for spatially detailed inventories. The convergence of remote sensing (RS), geographic information systems (GIS) and the global positioning system (GPS) in the 1990s radically changed both disciplines' perspective of maps, mapped data and potential applications. Precision Agriculture was born by extending the RS/GIS/GPS triad to robotics where “*spatial statistics*” is used to generate a prescription map based on factors driving crop growth/yield that, in turn, precisely directs on-the-fly application of a management action throughout a field, such as site-specific fertilization application, ph adjustment, insect/disease spraying and variable rate seeding. Natural Resource management, on the other hand, focused increasingly on the “*spatial context*” information contained in mapped data for such applications as habitat analysis, recreation easements, visual assessment, harvest block delineation, haul road design and wildfire behavior modeling. As both disciplines continue to evolve in their use of geospatial technology a hybrid field of “Precision Conservation” is emerging that extends precision agriculture to the watershed/region level with an ecological perspective that focuses on the cycles and movements of soil and water. *This presentation assesses the similarities and differences in Natural Resource and Agriculture use of GIS technology with particular emphasis on map analysis and modeling.*

References: (PowerPoint slide set and supporting materials for this presentation is posted at www.innovativegis.com/basis/present/Manitoba_Sep2014/)

- **Map Analysis and Modeling in Forestry's Future:** *Where we are headed and how we can get there — plenary session for Esri Forestry GIS Solutions Conference, April 30-May 3, 2012, Redlands, CA.* J.K. Berry. http://www.innovativegis.com/basis/Papers/Other/Esri_Forestry2012/
- **GIS Modeling in Natural Resources** — *Topic 8, Book IV in the Beyond Mapping Compilation Series online book in the four-part compilation series of the Beyond Mapping columns published in GeoWorld since 1989.* http://www.innovativegis.com/basis/BeyondMappingSeries/BeyondMapping_IV/Topic8/BM_IV_T8.htm
- **Who's Minding the Farm** — *invited feature article, GeoWorld, Adams Business Media, Chicago, Illinois, Feb 1998, 11:2 46-51.* J.K. Berry. http://www.innovativegis.com/basis/present/GW98_PrecisionAg/GW98_PrecisionAg.htm
- **Precision Conservation for Environmental Sustainability** — *Journal of Soil and Water Conservation, Nov/Dec 2003, Vol. 58, No. 6, pg 332-339.* J.K. Berry, J. A. Delgado, R. Khosla and F.J. Pierce. <http://www.jswnonline.org/content/58/6/332>



Joseph K. Berry is a leading consultant and educator in the application of Geographic Information Systems (GIS) technology. He is the principal of Berry and Associates // Spatial Information Systems (BASIS), consultants and software developers in GIS technology and the author of the "Beyond Mapping" column for GeoWorld magazine since 1989. He has written over two hundred papers on the theory and application of map analysis techniques, and is the author of the popular books *Beyond Mapping* (Wiley, 1993), *Spatial Reasoning* (Wiley 1995), *Map Analysis* (GeoTec Media, 2007) and *GIS Modeling* (BASIS Press, 2014) Since 1976, he has presented college courses and professional workshops on geospatial technology to thousands of individuals from a wide variety of disciplines. Dr. Berry conducted basic research and taught courses in GIS and Remote

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