

GIS in natural resource education: Where are we headed?

Joseph K. Berry

Warner College of Natural Resources, Colorado State University, USA

Over the past three decades, GIS education has evolved from a focus on automated cartography, to spatial database management, to geo-web applications. Within these contexts, curricula have emphasized the mechanics of descriptive mapping (“Where is What”) involving acquisition, storage, retrieval, query and display of spatial objects. However, the future of GIS education is moving from a “down the hall and to the right” specialist’s role for providing mapped data, to a broader and more active role of providing spatial information for natural resource research, policy, planning and management. The instructional emphasis is shifting from data-centric tools to application-specific constructs of prescriptive mapping (Why, So What and What If) that infuses consideration of geographic patterns and relationships within problem-solving contexts. The paradigm shift replaces spatially-aggregated tools and models that assume uniform or random distribution in geographic space with spatial reasoning and analytical procedures that capitalize on the variation within and among map variables.

The result is a “map-ematical” structure that enables earth science professionals to better understand and communicate complex spatial interplay of edaphic, topographic, biological, ecological, environmental, economic and social considerations. It provides a common foothold for integrating dialog among the seemingly disparate disciplines within natural resources, as well as across campus. This paper describes an comprehensive instructional approach, framework and classroom materials for teaching grid-based map analysis and modeling concepts and procedures as direct spatial extensions of traditional mathematics and statistics to students with minimal or no GIS background.

Making a Case for SpatialSTEM: Spatial Considerations in Science, Technology, Engineering and Mathematics Education — white paper describing a framework for teaching grid-based map analysis and modeling concepts and procedures as direct spatial extensions of traditional mathematics and statistics to students with minimal or no GIS background

Spatial STEM: Extending Traditional Mathematics and Statistics to Grid-based Map Analysis and Modeling — white paper describing an innovative approach for teaching map analysis and modeling fundamentals within a mathematical/statistical context

An Analytical Framework for GIS Modeling — white paper presenting a conceptual framework for map analysis and GIS Modeling

GIS Modeling and Analysis— book chapter on grid-based map analysis and modeling

A Brief History and Probable Future of Geotechnology — white paper on the evolution and future directions of GIS technology

Beyond Mapping III, an online book containing Introduction, 28 Chapters and Epilog as a compilation of the popular Beyond Mapping columns published in Geo World magazine from 1996 through present, BASIS, Fort Collins, Colorado, 2010. J.K. Berry. www.innovativegis.com/basis/MapAnalysis/

jberry@innovativegis.com

Microstructures in the cretaceous bima sandstone, upper benue trough, n.e. Nigeria: Implication for hydrocarbon migration

N.K. Samaila¹, E.F.C. Dike¹ and N.G. Obaje²

¹Geology Programme, Abubakar Tafawa Balewa University, Nigeria

²Department of Geology and Mining, Nasarawa State University, Nigeria

Faulting related to movements along major fault zones in the Upper Benue Trough during Albian times, with evidence of deformation in the Cretaceous Bima Sandstone are common especially around the Kaltungo, Gombe, Zambuk and Teli lineaments. Conjugate extensional systems of deformation bands show increased siliceous cementation of the sandstones adjacent to these lineaments. During the Late Cretaceous compressional event, the deformation bands and faults in the Upper Benue Trough were reactivated, resulting into dilatational opening of fractures believed to have acted as fluid conduits and/or barriers. These deformation bands which decrease in density away from the major faults are characterized with increasing porosity and permeability in the host sandstone abruptly away from the tectonic barrier. It is proposed here that the master faults of the Benue Trough, linking it with the Anambra Basin and the Niger Delta probably served as conduits for the migration of hydrocarbons into the Cretaceous reservoirs of the Upper Benue Trough and by extension into the Niger Delta.

nsamaila@yahoo.com