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Exploring Abandoned GIS Research to Augment Applied Geography Education

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ABSTRACT

Applied geography has enjoyed a revival in large part due to the increased availability of geospatial software often resulting in its wholesale adoption in applied geography programs throughout academia. One unintended consequence of this adoption is that much of the conceptual content responsible for the historical development of GIS is largely not covered in the applied geography coursework. When applied geography programs focus on software application without considering its limitations, the applied geography student gets the misconception that the geographic underpinnings upon which the software is based are thoroughly understood and tested. A result of this, applied geography students often employ the tools with little or no understanding of their limitations for modeling real geographic processes. This article proposes that one aspect of an applied geography curriculum must include the study of the underlying principles upon which the software is based, and perhaps more importantly, the study of concepts that were abandoned in the early days of tool development.

KEYWORDS

Applied Geography Education, GIS Education, Retrospective Approach, Teaching Methods

INTRODUCTION

As the number of applied geography programs increases across the country and abroad there is a concomitant proliferation of Geographic Information Systems (GIS) courses, many of which focus on the application of existing state-of-the art technology to geographic problems. The nature of these applied programs, the workforce demands for familiarity of GIS software use, and the ready availability of professional GIS software in the classroom predispose this educational path. While applied programs are by design less likely than traditional university programs to focus on the computational side of GIS – what Duane Marble called the "top of the pyramid," I posit that knowing the intellectual roots of the computational side of GIS is a necessary component of the education of those applied geographers who employ GIS in their studies. A basic understanding of the degree to which GIS, as it is currently implemented, effectively mimics the geographic environments and processes the software is meant to is critical if the applications are to be of use to solving real problems. That knowledge allows the practitioner to more carefully select and employ their tools to geographic problems and to exercise caution in their evaluation of model results. Additionally, examining early computational constructs

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of GIS development provides insights into how space has been conceptualized and how those early conceptualizations were eventually adopted and why others were abandoned. This knowledge provides insights into how the field "… could and should evolve in coming years" (Wellar, 2015), further enhancing the practitioner's comprehension of both current limitations and future prospects for modeling. This paper presents several examples of how the linkage between how GIS is currently designed as a result of historical evolution of the technology can inform the learner of the limitations of the software to recreate geographic features and processes.

In his book, How to Lie with Maps, Mark Monmonier (2018) clearly points out the many purposeful and accidental ways in which maps can lie about the real world they represent. This seminal work points to an even larger capability to mislead when GIS technicians not only misrepresent data on final cartographic products, but also misuse the computational tools within the software to produce such output. Perhaps even more disconcerting is that the output might very well be presented correctly as output while the consumer has no way of knowing how the product was derived.

A case in point is a study involving the development of a DRASTIC model (Aller et al., 1985) of potential ground water pollution potential for the lower Rio Grande river valley. When first presented, the results clearly showed that the potential ground water pollution potential increased from north to south; more specifically from upstream to downstream (Figure 1).

Closer inspection of the map, however, clearly indicated that the DRASTIC numbers ranged from a low of 2, to a high of 2552. These values are clearly orders of magnitude higher than can be expected from the calculations. As it turns out, the map was not actually a map of DRASTIC numbers, but rather a map of ID codes associated with the sequence of digitized points which increased from the

Figure 1. Model output for the Mesilla Valley Groundwater Aquifer that purports to show an increase in environmental sensitivity from north to south, but which actually displays the polygon ID numbers (map provided as a courtesy by its author)