Keeping the Dust Bunnies out of the Watershed Conservation Plan

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ABSTRACT

In 2003 Buchart-Horn, Inc. was contracted to conduct and prepare a Watershed Conservation Plan (WCP) for the 510 square mile Conewago Creek Watershed (Watershed). The Watershed is part of the much larger Chesapeake Bay Watershed, and as a result, proper planning and management of the watershed is imperative. The goal of the WCP was to develop a long term management plan for the Watershed. Often, these plans are left to collect dust on a shelf and are not used as the tool for which they were intended. Therefore, Buchart-Horn, Inc. decided to provide the WCP in an interactive GIS map format in addition to the paper document. This paper will discuss the how GIS was used to provide local planners and stakeholders with a planning tool that provides easy access to data and plan recommendations as well as provides a method for monitoring the effectiveness of the WCP.

INTRODUCTION

The Conewago Creek drains a 510-square-mile area in the Lower Susquehanna River watershed. The confluence of the Conewago Creek with the Susquehanna River lies just a few miles north of the Chesapeake Bay (Figure 1). It is widely known that the Conewago Creek is a major contributor of sediment to the Susquehanna River and hence, the Chesapeake Bay. Given the watershed's proximity to the Bay, an appropriate level of planning and management of the watershed is imperative, but the Conewago has tended to be overshadowed by larger, higher-profile watersheds nearby. Recently, however, the watershed in both York and Adams counties has seen significant increase in development, accompanied by both a drop in water quality and an increase in such problem indicators as bank erosion. The Conewago Creek needs management to preserve its many unique features and to control the pressures for development and growth. Despite the location of a significant portion of the development in a water quantity stressed area, growth and development continue.

Recent DCNR directives indicate a desire to develop long term watershed management plans that use new technology to reduce paper copies while still presenting plans and reference materials in a logical, easy-to-use format. Buchart Horn, Inc. has extensive experience in technology appropriate for watershed planning, the experience to conduct watershed assessments and the subsequent development of a long-term management strategy. Recognizing this experience and expertise, the Pennsylvania Environmental Council, with its own experience with similar plans, teamed with Buchart Horn, Inc. to prepare a WCP for the Conewago Creek Watershed. The goal of the River Conservation Program and the purpose of Watershed Conservation Plans and River Conservation Plans (RCPs) is the development of long-term watershed management plans that will identify issues, concerns, and threats to resources; identify unique watershed preservation, protection, and restoration opportunities; identify cultural, recreational, and historic resources and recommend appropriate new facilities; and a comprehensive list of recommendations that municipal governments within the watershed can

adopt by resolution. Historically, WCPs and RCPs are text extensive technical reports that tend to alienate local stakeholders such as municipal representatives. One of the biggest benefits to the municipalities for supporting WCPs and RCPs is the watershed's listing on the Rivers Registry. This opens the door for prioritized funding of the Plan recommendations, thus relieving the municipalities of the funding responsibilities.

Figure 1. Location: Conewago Creek Watershed, York and Adams Counties, Pennsylvania

THE CHALLENGE

In most cases, WCPs and RCPs have failed to be used to their potential. Because of the large scale of the plans, they contain far more valuable information than the municipalities can use. While this is a Plan requirement, the magnitude of the data collected make them largely opaque to the local government officials and interested lay people. They might like to, but they find it very difficult to take a look inside their areas. Traditionally, WCPs and similar plans sit on bookshelves collecting dust. Only on rare occasions might a planner look at some of the mapping or recommendations. But the size of these reports makes even that cumbersome. The challenge in developing the new WCPs became one of format, leading to the question, "What format or mode of presentation is best for the final deliverable?"

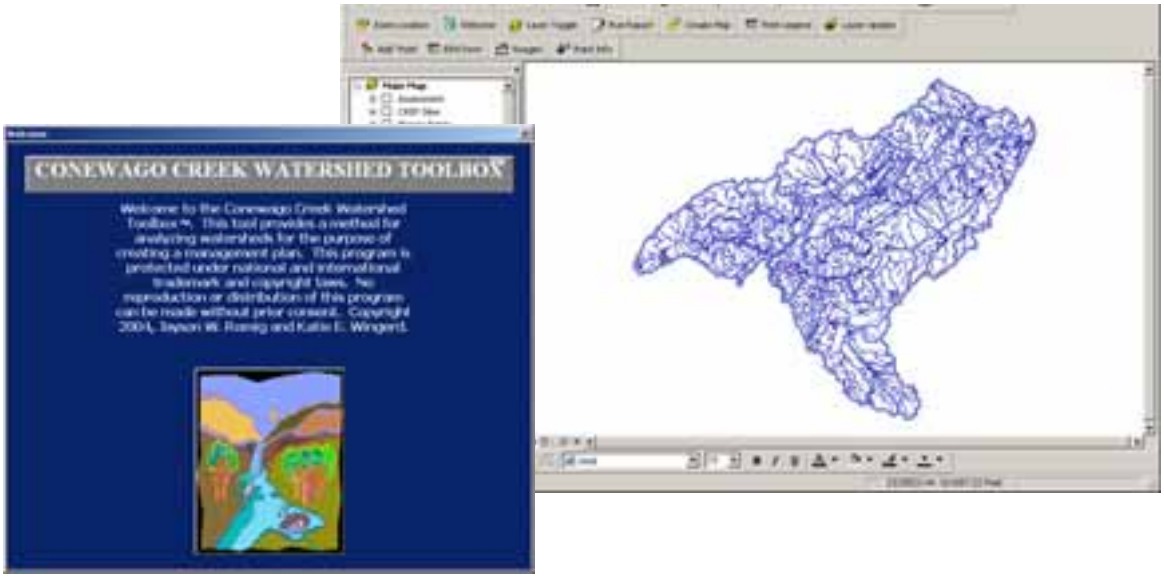
THE SOLUTION

To make the reports more accessible, and as an experiment in integrating it with GIS (GIS was already being used to develop the plan), Jayson Romig and Katie Wingerd of Buchart Horn developed an interactive GIS-based watershed assessment and management tool whereby users without GIS training can still surf the watershed in the same way that Internet users surf the Net. The Watershed Toolbox© was developed in 2002, when Buchart Horn teamed with the Codorus Creek Watershed Association to prepare the Codorus Creek RCP, which was also funded through the River Conservation Program at DCNR. This tool is being used to develop the Conewago Creek Watershed Conservation Plan, and is being enhanced to provide greater accessibility and a wider range of analysis tools.

The idea of an interactive GIS tool came from other projects that were using field computers (pen tablets) to record facility inspection results and subsequently edit CAD drawings. This approach was saving several steps over the traditional process, which has included collecting the information on paper and then transferring it to databases and maps in the office. Our thought was that if the field computers could be used for tunnels, bridges, and buildings, they could also record watershed information for mapping, assessment, and planning. If we could achieve a direct path from watershed to pen tablet to database, our efficiency would be greatly improved. Further, the watershed planners wanted to develop something that would record data into a database and then link it to the GIS information. After many brainstorming sessions, the idea of a separate database was dropped and we determined that the best option would be recording the information directly into the GIS. Thus, the Watershed Toolbox © was created.

The Watershed Toolbox© was first developed as a separate initiative and then adapted to specific watersheds such as the Codorus Creek and Conewago Creek. As a result, assessment and planning functions are already built in, even though the municipalities only need and require the planning function. We developed the toolbox as an ESRI ArcMap interface using Visual Basic programming, which contains a separate toolbar for watershed assessment and watershed reporting. These toolbars contain several buttons that allow a user unfamiliar with GIS to manipulate maps, query the system, and derive reports, easily (Figure 2).

Figure 2. Watershed Toolbox© ArcMap interface.



The assessment functions include zoom-to-location, layer toggle, map creation and assessment. The zoom-to-location button allows the user to create a locational query to refresh the map to a specific location of interest. It contains methods for searching by sub-watershed, municipality, grid, or even parcel address, owner or number. The layer toggle provides the user with a list of layers within the tool and prompts the user to select the layers he or she wants to view. Map creation creates a map with a few ready-to-use, customized legend items so that the user does not have to create them. The assessment portion of the toolbox contains customized forms designed to prompt the user in the field to assess such features as riparian buffers, wetlands, problem areas, stream stability, stormwater issues, erosion and sediment control, and others. The forms are geographically connected in the Toolbox to the actual field location and contain many drop-down lists, which limit the keyboard proficiency demands on the user. Samples of the Forms are displayed in Figures 3 and 4.

Figure 3. Basic Assessment Information Form.

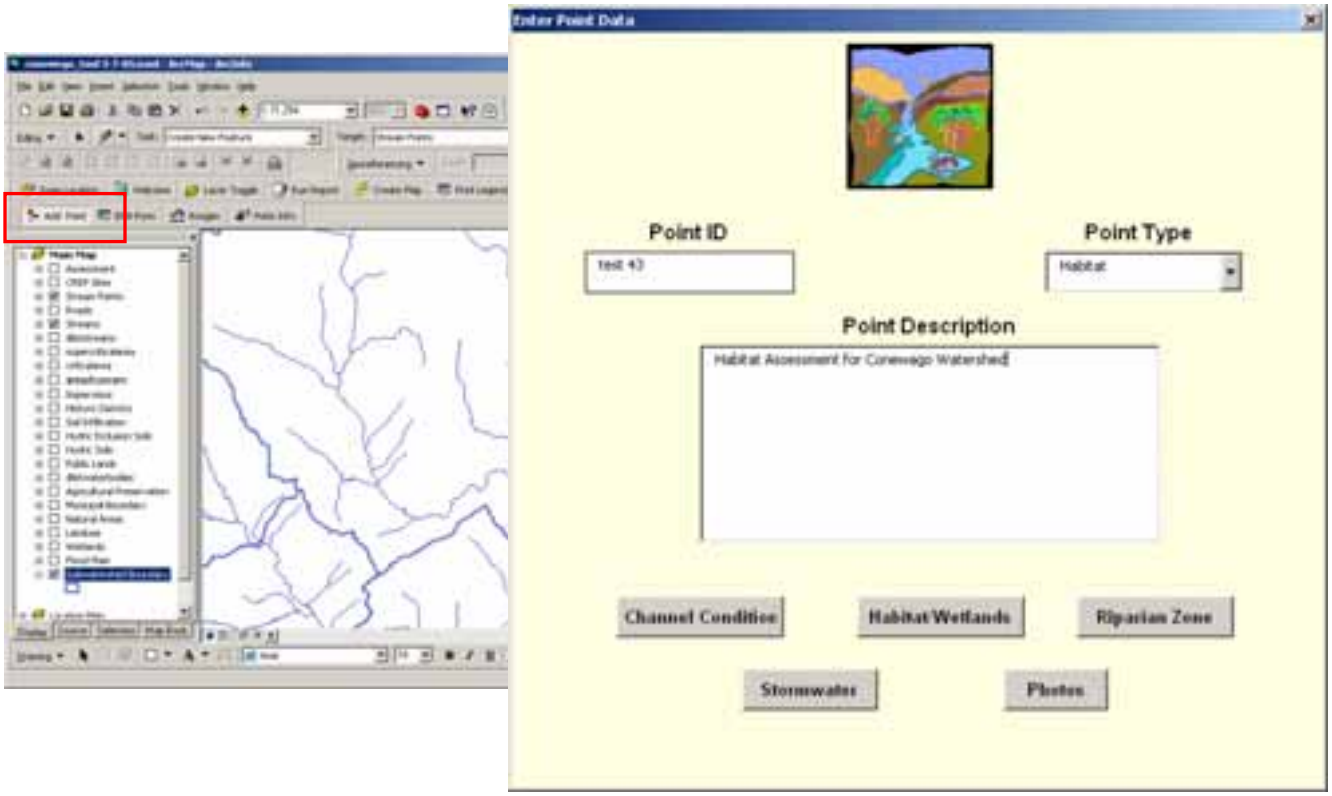
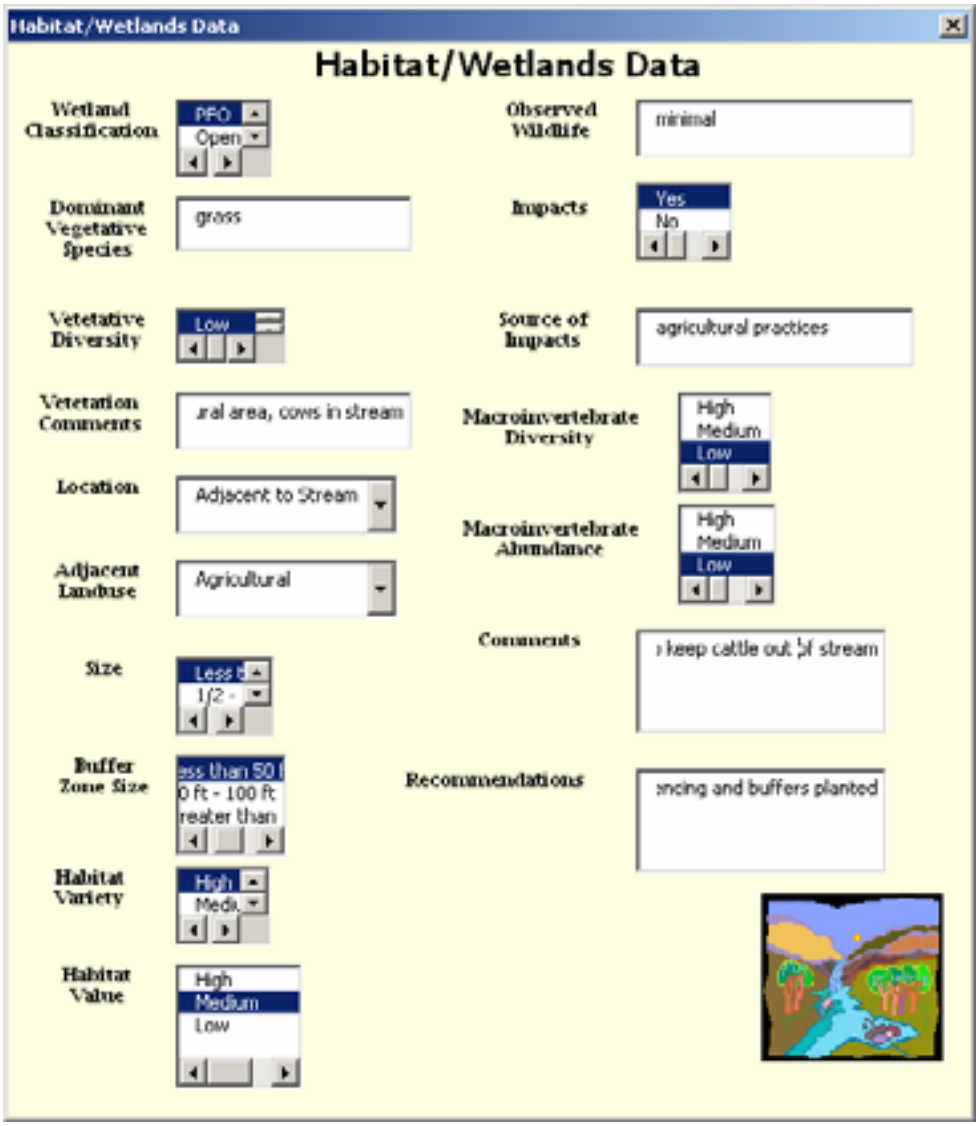


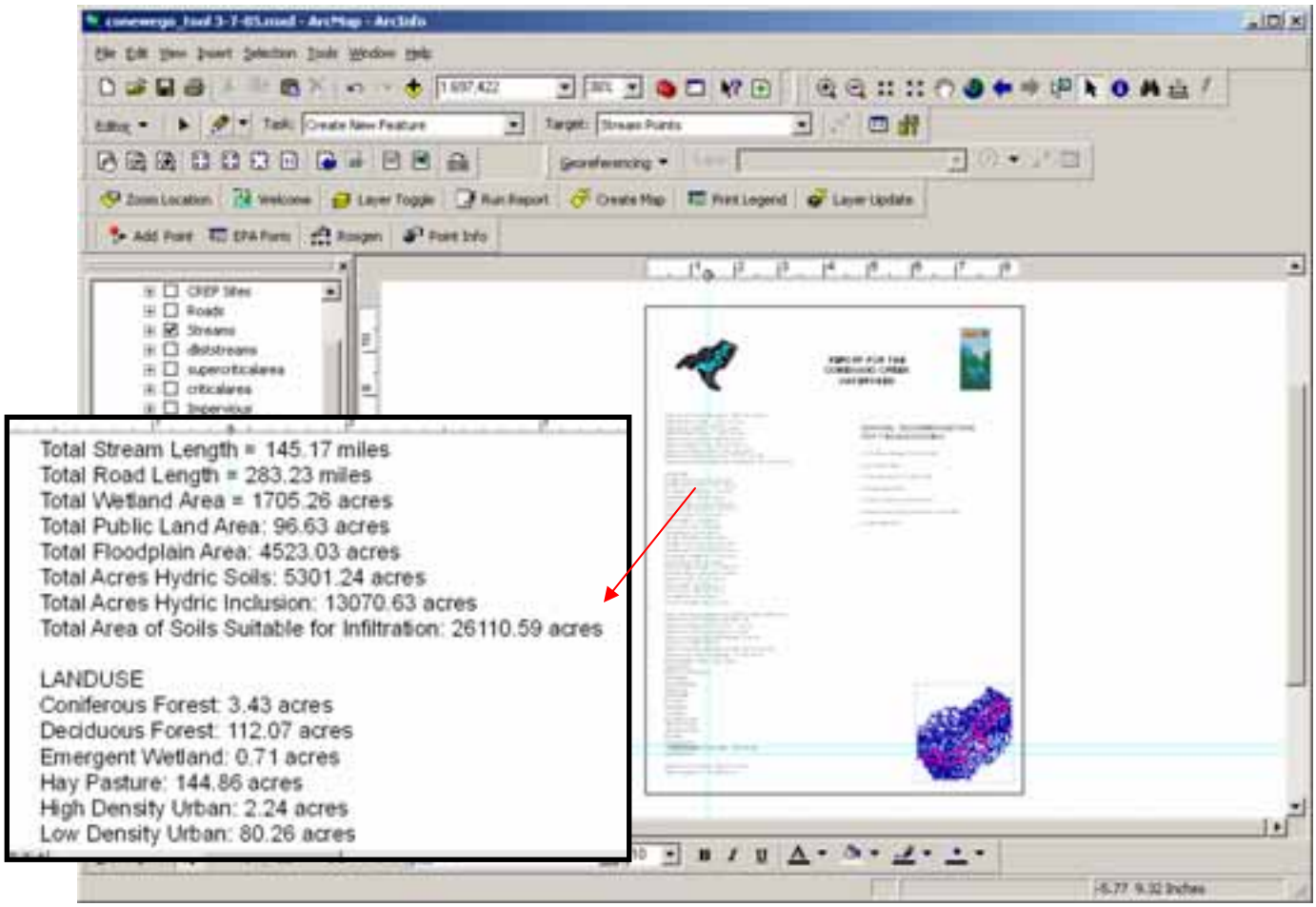
Figure 4. Habitat Assessment Information Form.



The planning end of the Toolbox includes the same zoom-to-location, layer toggle, and map creation functions as the assessment toolbar. However, it also contains report-development functions based on the subwatersheds within the main watershed. In order to create a subwatershed report, the user selects the tool and then clicks on the subwatershed of interest within the map. The tool then uses that subwatershed as a "cookie cutter" to analyze many different layers within the tool. Some of the items that the tool reports are total stream length within the subwatershed, a breakdown of land uses by acre, zoning information, impaired waters, assessment site rankings, and others. The reporting tool also presents the recommendations for that subwatershed, which were developed through the planning process, Figure 5. This reporting functionality and the Watershed Toolbox in general give planners the ability to access information easily and plan recommendations on the spot, whether they are reviewing a subdivision plan or a zoning ordinance change. While none of the planning functions are necessarily unique to someone with GIS experience, the Toolbox has been designed to perform

the same tasks with the click of one button, as opposed to multiple buttons and multiple steps. As a result, a user doesn't need GIS training to use the Toolbox.

Figure 5. Subwatershed Reporting within Watershed Toolbox©.



DISCUSSION

The information collected in the Toolbox while developing a Watershed Conservation Plan includes zoning, land use, soils, problem areas, stream instability, soils suitable for infiltration, roads, wetlands, water resources, critical habitat and recreational opportunities. These are all valuable data sets for local municipal planners. The ability to access this data in an easy to use electronic format facilitates the goals of the Watershed Conservation Plan. Further, the Toolbox includes all of the plan recommendations, so a user can access that data interactively. For example, if a municipality wishes to install a recommended boat access, the boat access location is on the Toolbox. The user can click on the location, where the information on that recommendation will be presented. It is easy to update the Toolbox with new or more current layers. Planners, stakeholders and watershed professionals will therefore be able to monitor progress within the watershed as plan recommendations are implemented.

The Watershed Toolbox makes it possible for any interested person, GIS-conversant or not, to peel the information onion without tears.

FUTURE DEVELOPMENT

Because of the usefulness of the Watershed Toolbox©, plans are under way to further enhance its functionality and accessibility. Some of those plans include more customized mapping, automatic layer updating and a web-based version. The web-based version will free the user from the need for GIS software; it will be developed using ESRI's ArcIMS internet mapping software.

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