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VISUALIZING AGROFORESTRY ALTERNATIVES OR PIXEL THIS!

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ABSTRACT

Natural resource professionals often hear the words, "*What will it look like?*" from landowners who have difficulty in understanding a proposed agroforestry or conservation plan. Planting plans and engineering drawings, while necessary, often mean little to the general public. When practices require a long-term commitment like agroforestry, landowners want to know what it will actually look like on the ground before committing to a plan. Now resource professionals have a tool to translate these plans into real-life pictures or images called visual simulations. Visual simulations are digital images which have been altered to illustrate design alternatives. Using image-editing software, proposed designs can be "created" by adding images of plants and other landscaping materials onto a base image of the landowner's property that has been acquired from either a scanned or digital photo. In a relatively short time, windbreaks, riparian buffers, and other agroforestry practices can be illustrated at various stages of development, compositions, and arrangements on the landscape. The USDA National Agroforestry Center has developed the ***CanVis Visual Simulation Kit*** consisting of the *Visual Simulation Guide*, a multi-media, CD-reference manual on how to create simulations for natural resource planning and *CanVis*, an image-editing software program designed specifically for conservation applications. By communicating ideas through visual simulations, tools like the ***Kit*** can greatly influence public participation in the planning and design process, enhancing acceptance and adoption of agroforestry and conservation practices. As the old saying goes, a picture can really be worth a 1000 words!

Keywords: Visual Simulations, Agroforestry, *CanVis*, Photo-realistic, Planning

INTRODUCTION

For the uninitiated, agroforestry is often a challenging land management strategy to visualize or comprehend. Despite the use of planting plans and engineering drawings, many landowners still have difficulty in conceptualizing what a proposed agroforestry practice or system will actually look like on their landscape. This lack of understanding often creates impassable barriers in the planning process and is exacerbated by the long-term commitment that agroforestry requires from landowners. Landowners often lament if they could only see a picture of the proposed action to aid in their decision making. Now resource professionals have such a tool called visual simulations to help address this problem.

Visual simulation is a term used to describe a graphic or model that portrays a change from the existing condition (Sheppard 1989). Simulations can range from perspective drawings and image-editing to complex 3-D models and animations. While some of these simulation methods

are time consuming and difficult to learn, for many resource professionals the use of computer image-editing techniques to illustrate proposed landscape changes in 2-D digital photographs is a realistic skill to acquire. Using image-editing software, proposed designs can be "created" by adding images of plants and other materials onto a base image of the landowner's property that has been acquired from either a scanned or digital photo. In a relatively short time, windbreaks, riparian buffers, and other agroforestry practices can be illustrated at various stages of development, as well as different species compositions and arrangements.

The versatility of visual simulations allows this tool to be used for a variety of tasks in agroforestry, from policy development to program implementation. Some specific tasks include:

- a planning tool to present alternatives and solicit feedback (Figure 1),
- a training aid to help convey management concepts (Figure 2),
- a marketing tool to illustrate new conservation programs and activities (Figure 3),
- a visual-impact analysis tool for public meetings and documents (Figure 4), and
- a construction aid to contractors (Figure 5).

Photo-realistic simulations facilitate agroforestry planning in several key ways. It can promote better understanding by stakeholders of the proposed alternatives and management actions while increasing stakeholder involvement in the planning process (Stoltman et al. 2004). The visual nature of simulation invites stakeholders to offer feedback on the alternatives, facilitating the development of a shared vision for the landscape or watershed (Al-kodmany 1999). This process greatly increases a sense of ownership in the plans, which leads to enhanced acceptance and adoption of agroforestry (Al-kodmany 1999). All of these factors contribute to a more efficient and effective planning and design process.

The use of this technology is not without its caveats and limitations. One limitation for the use of 2-D visual simulations is that these represent only a snapshot in time and do not allow a dynamic interaction like 3-D animation. However, 3-D animation is very time consuming, necessitates expensive software and hardware, and requires users to develop very specialized skills. Although the skills and time required to create a 2-D simulation are minimal in comparison, users must still make sure they are accurately locating and sizing the proposed objects to illustrate a correct depiction of the proposed scenario. Incorrect and misleading simulations on agroforestry practices and systems will just frustrate landowners when the mature projects resemble nothing close to the simulations, greatly damaging the reputation of the resource professional and their organization and severely eroding away support for agroforestry (Sheppard 2001).

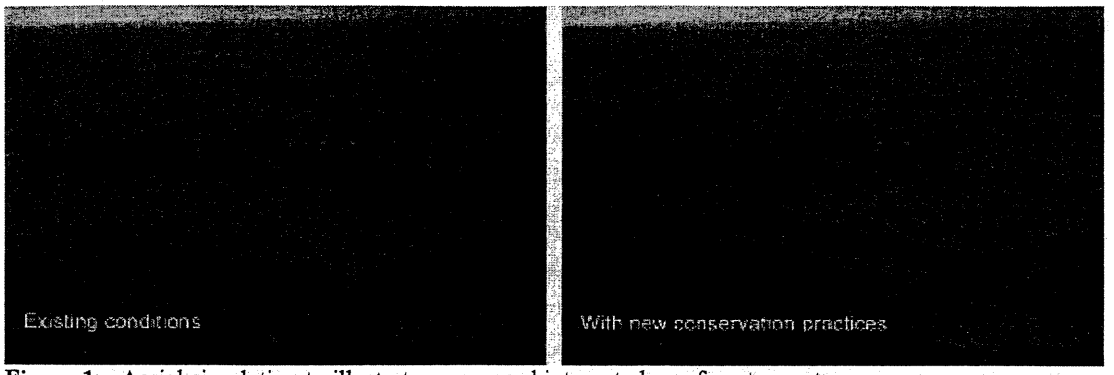

Figure 1. Aerial simulation to illustrate a proposed integrated agroforestry system.

Figure 2. A simulation developed to convey management techniques and impacts for woodlot thinning.

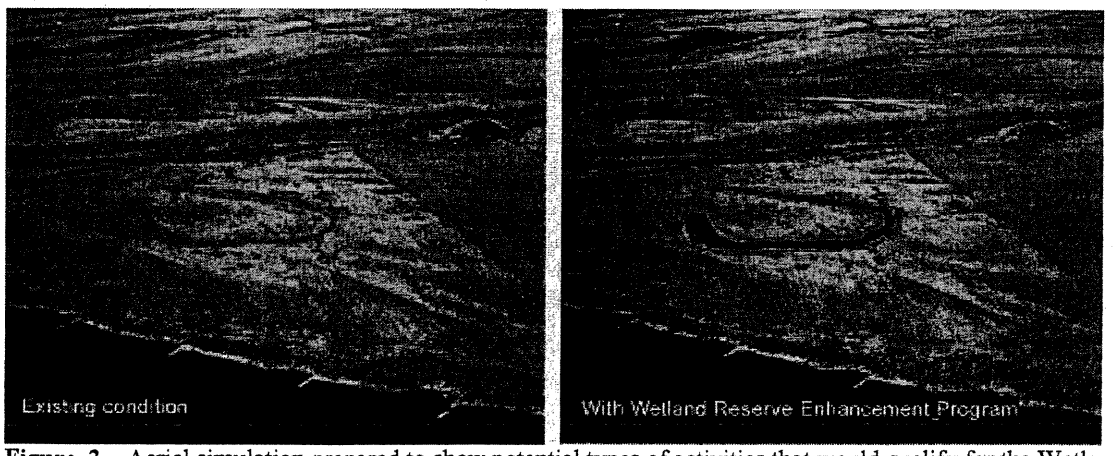

Figure. 3. Aerial simulation prepared to show potential types of activities that would qualify for the Wetland Reserve Enhancement Program.

Figure 4. Simulation created for a visual impact assessment for a public hearing.

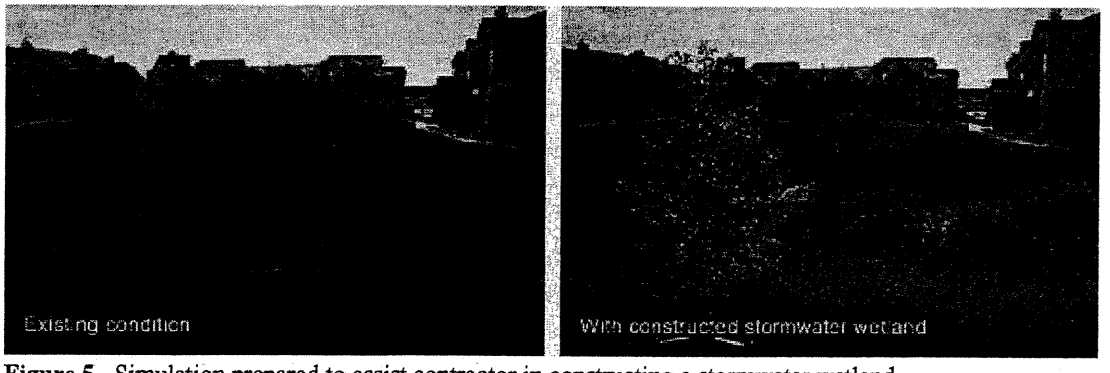

Figure 5. Simulation prepared to assist contractor in constructing a stormwater wetland.

CANVIS VISUAL SIMULATION KIT

To promote the use of visual simulations as an effective tool in agroforestry planning and design, the USDA National Agroforestry Center (NAC) has prepared the ***CanVis Visual Simulation Kit.*** This kit consists of the *Visual Simulation Guide* and the *CanVis* image editing software program.

The *Visual Simulation Guide* is a multi-media, CD-reference manual on how to use image-editing software to create visual simulations for natural resource planning. The *Visual Simulation Guide* provides instruction on how to plan a simulation project, acquire images, edit an image, and accurately locate and size imported objects. The guide demonstrates the use of ground-level, elevated-ground-level, and oblique-aerial viewpoints for simulations. To ensure that users can create accurate simulations, the guide offers extensive instruction on how to use perspective principles and scaling methods derived from trigonometry to correctly size and locate plant materials and other objects in the images. Ten agroforestry and natural resource planning projects are provided on the CD as working examples. These projects illustrate simulations with different levels of detail, from quick conceptual images to complex and detailed visual simulations. Videos are used to showcase these projects and users can develop and evaluate their skills by imitating these editing examples. Using the guide, resource professionals can gain the skill and confidence that the simulations they create are accurate depictions of proposed design alternatives.

With a commercial software developer, NAC developed the *CanVis* program that allows resource professionals to create realistic simulations with minimal computer skills. One of the main advantages of this program is its collection of existing object libraries that contain images of plants materials, agricultural features, people, wildlife, and park elements that can be quickly added to the base image. There are more than 500 images currently available in the object libraries, saving users' valuable time by not having to create plant images and other objects from scratch. Objects from the libraries can be inserted into an image, placed at the proper location, and resized to reflect the correct height. The object's color and contrast can also be adjusted to make the object fit the color characteristics of the base image.

In some cases, users will have objects that they would like to use in their simulations on a regular basis which are not currently in these object libraries. In *CanVis*, there are several easy ways that users can create and add their own unique objects to the libraries for future use. Some of the other tools available in *CanVis* include:

- adding shadows and text,
- cloning textures, and
- adding hardscape elements like pathways and walls.

To learn more about the ***CanVis Visual Simulation Kit***, log on to NAC's website at http://www.unl.edu/nac/simulation/.

CONCLUSION

While additional scientific research and data on agroforestry will be beneficial to resource professionals and policy makers, we need to realize this information may actually play only a very limited role in promoting the adoption and acceptance of agroforestry by landowners. As Nassauer et al. (2001) state, we must go beyond providing tools that only address the ecological and economic aspects of sustainability and provide those which also enhance the cultural sustainability of agroforestry systems; that is, it must elicit sustained human attention over time. Without this, benefits may be compromised as land ownership changes, as development pressure increases, or as different political viewpoints arise. Visual simulations can help build that foundation for cultural sustainability by communicating ideas clearly, by inviting feedback on the alternatives, and by instilling a sense of shared ownership in the agroforestry system.

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