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PLANNING FOR MULTI-PURPOSE RIPARIAN MANAGEMENT

Gary Bentrup[1*], Mike Dosskey[1], Kelly Klenke[2], Tim Leininger[1], Michele Schoeneberger[1], and Gary Wells[3]

ABSTRACT

Proper riparian management can provide numerous environmental, social, and economic benefits. At the USDA National Agroforestry Center, we are tailoring the land-use planning process to facilitate riparian management in the Western Corn Belt ecoregion for multiple benefits. This planning framework integrates regional, landscape and site scale planning approaches into a unified framework. In this framework, regional and landscape-scale public issues are addressed along with site-scale landowner objectives to facilitate balanced management plans providing broad mutual benefits. Our question-driven framework provides general guidance for inventory and analysis, preparation of planning objectives, and development and evaluation of management options. To support the planning framework, planning tools and data are being developed to assist stakeholders in creating riparian management plans.

KEY TERMS

Riparian Management, Corn Belt Region, Riparian Planning, Spatial Scales, Geographic Information Systems

INTRODUCTION

Intensive agricultural production in the Western Corn Belt ecoregion (Fig. 1) has created an undesirable decline in the condition of the region's riparian areas due to single focus management. In contrast, holistic riparian management can provide numerous environmental, social, and economic benefits. For example, riparian areas can be managed to improve water quality and wildlife habitat, provide aesthetically-pleasing greenways, and yield commodities. Effective riparian management must balance multiple issues, however a comprehensive planning framework for doing so does not currently exist.

At the USDA National Agroforestry Center (NAC), we are tailoring the land-use planning process to facilitate riparian management for multiple benefits in the Western Corn Belt ecoregion (as defined in this paper) (Fig. 1). In this framework, regional and landscape-scale public issues are addressed along with site-scale landowner objectives to facilitate balanced management plans providing mutual benefits. In order to accomplish this, it is critical to consider information from several spatial and temporal scales. This framework integrates regional, landscape, and site scale information (scales defined in Fig. 2). The framework also incorporates a temporal perspective to provide a better understanding of the dynamics of the riparian ecosystem. The hierarchical integration of temporal and spatial information along with community and landowner objectives promotes the creation of a holistic riparian management plan.

Figure 1. Western Corn Belt Ecoregion

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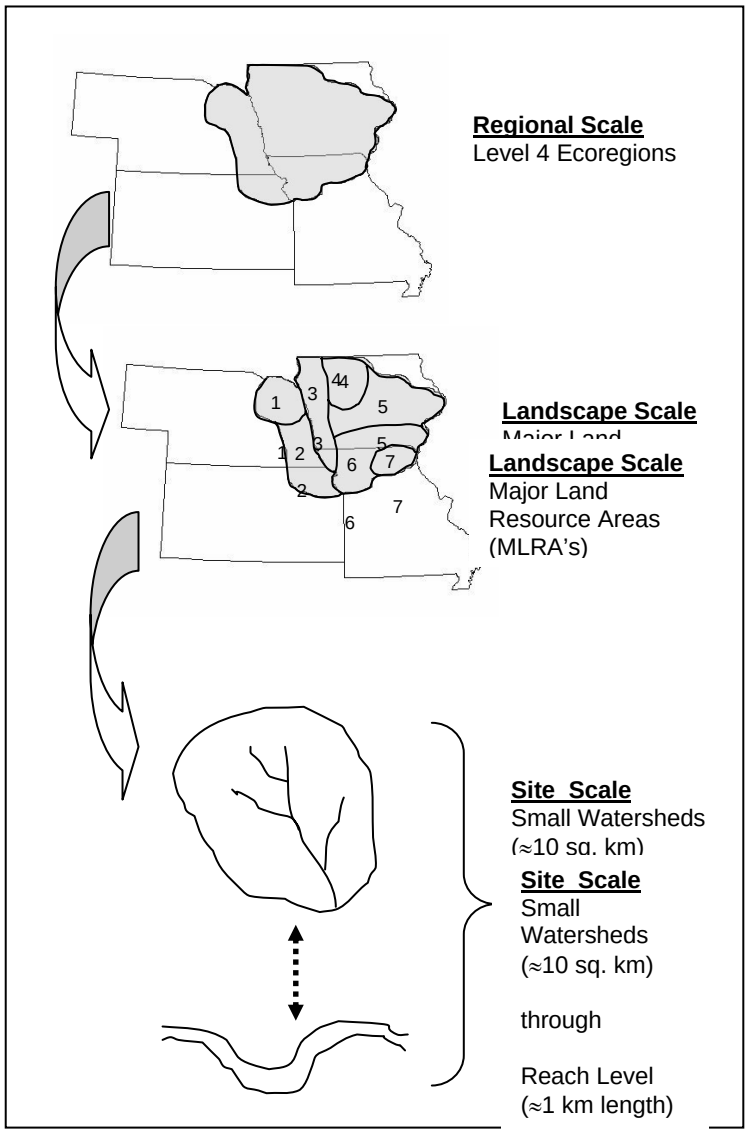

Figure 2. Spatial Scale Definitions

Figure 2. Spatial Scale Definitions

The site scale component guides the ssment into dual sites. At each site, specific landowner objectives are blended with community goals expressed in the landscape assessment. Design options include size, vegetation composition, and management of the riparian area. Subsequent monitoring is conducted in order to judge impacts and indicate any need for making adjustments to achieve planning goals.

The primary use of the planning framework is to aid planners and landowners in the site design of riparian areas. Other uses may include developing strategies for regional and landscape level riparian restoration, targeting resources, and educating local stakeholders on the value of riparian areas. Because of these various uses, the framework can be initiated at any scale

PLANNING FRAMEWORK

There are three primary components of the planning framework: a regional reconnaissance, a landscape-scale riparian assessment, and site-scale riparian plans (Fig. 3). At the regional scale, a reconnaissance of existing spatial and temporal information provides a general assessment of environmental conditions and resource issues. This quick reconnaissance provides a regional context that enables stakeholders to consider multiple resource issues in their riparian planning effort and to capitalize on the capabilities of riparian management to address several issues simultaneously.

At the landscape scale, more specific information is collected and evaluated along with the regional reconnaissance to identify community goals and desired future conditions for the riparian areas. The assessment also identifies critical riparian functions, general locations for riparian restoration and enhancement, and basic design criteria. When a formal planning group is present, this information is used to develop a publicly supported landscape scale riparian plan that will guide site scale riparian plans. If a landscape scale riparian plan is not developed, the assessment can still be used to guide individual site scale riparian planning and design efforts.

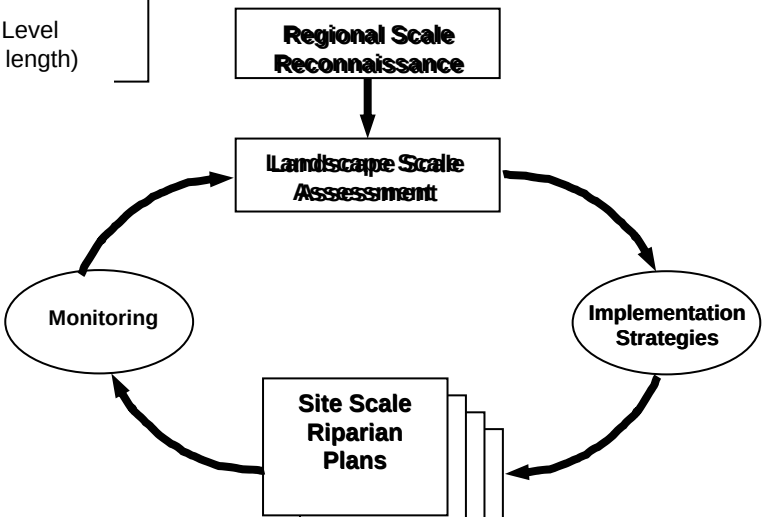

Figure 3. Framework for Riparian Management Planning (Having a Focus on Site-Scale Implementation, but Achieving Balance between Community and Landowner Goals)

Balance between Community and Landowner Goals)

QUESTION-DRIVEN APPROACH

To guide planners through this framework, each primary component is subdivided into steps (Fig. 4). Each step is characterized by a core question, general enough to facilitate consideration of many and various issues. The purpose of the broad core questions is to consider the riparian area in context with the surrounding upland areas. Riparian management-specific information is developed through a tiered set of questions underneath each core question (Fig. 5). In this simplified example, the term Abuffer≅ is used to denote current riparian management, and illustrates the question-driven approach for only landscape-scale hydrology and biodiversity issues. Similar sets of questions are being developed for other resources and for each step in site-scale planning. Taken together, these questions are designed to facilitate development of holistic riparian management systems that simultaneously address several issues.

A question-driven approach has been used in other planning frameworks because questions are effective at providing specific, but flexible, guidance for analyzing resources and developing plans (e.g., Montgomery et al., 1995; Smith and Hellmund, 1993; Steinitz, 1990). This approach is particularly effective at preventing issues from being inadvertently overlooked. It also allows the framework to be tailored to a specific purpose, in this case, riparian management. Additional questions and techniques can be developed and added to the framework as necessary.

DEMONSTRATING THE FRAMEWORK IN THE CORN BELT ECOREGION

This framework, its questions, and specific techniques are currently being developed and demonstrated for the Western Corn Belt ecoregion. Potential users of the framework include federal, state, and local government agency planners as well as non-profit organizations and landowners. To facilitate use of the framework, user-friendly tools and data are being developed. The following describes some of these tools and data that will support the planning framework.

Midwest Regional Atlas for Conservation Planning

The *Midwest Regional Atlas for Conservation Planning* is a compilation of assessment and resource maps collected from a variety of governmental agencies and non-governmental organizations. In addition to providing spatial information, maps included in the atlas also provide a temporal assessment. This atlas enables stakeholders to quickly consider multiple resource issues in their riparian planning effort and to capitalize on the capabilities of riparian areas to address several issues simultaneously.

Landscape Scale Riparian Assessments

Landscape Scale Riparian Assessments are being prepared by NAC for several Major Land Resource Areas (MLRA's) in the Western Corn Belt ecoregion (Fig. 2). MLRA's are geographic areas characterized by a similar pattern of soils, climate, water resources, and land uses. These assessments will provide planners and landowners with a foundation upon which to build their riparian management plan. Peer-reviewed methodologies are being used to assess the landscape for four key issues, biodiversity, soil protection, water quality, and agroforestry products. The assessments will be valuable in helping to prioritize riparian management projects. Guidelines for creating additional assessments will also be provided. The completed assessments will be packaged on CD-Rom with a freeware geographic information systems (GIS) program. In addition to the assessments, other general spatial data will be packaged on the CD such as roads, section lines, cities, etc. Users will be able to view and print the already prepared assessments or will be able to conduct other assessments using the additional data on the CD.

Riparian Planning and Design Manual

The *Riparian Planning and Design Manual* will explain how to use the framework and existing conservation planning tools to develop riparian management plans. Several case study examples will demonstrate how to use the *Midwest Regional Atlas* and *Landscape Scale Riparian Assessments* along with site-specific information to create multiple-objective management plans for a landowner's property. In addition to the manual, NAC is creating an image library and plant selection guide. The Internet accessible image library will contain downloadable images of riparian areas being managed for multiple objectives. The images can be used to communicate different design and management options with landowners. A plant selection guide is also being created to allow users to select plants based on the desired ecological functions of the riparian system.

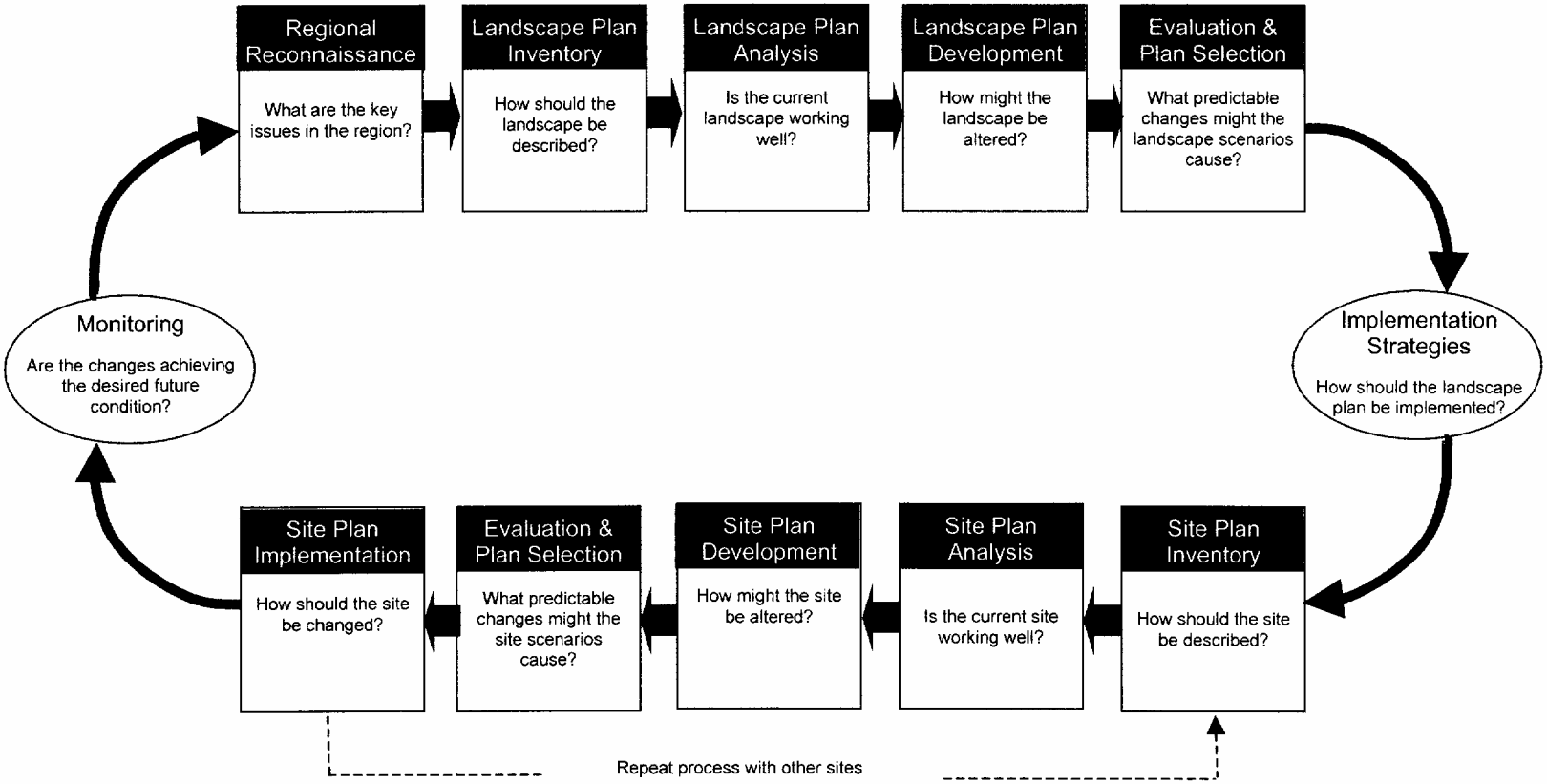

Figure 4. Conservation Planning Framework

Inventory Questions

Core Question
How should the landscape be described?

1.0 How should the hydrological system be described in the study area?
- 1.1 What are the main hydrological pathways?
- 1.2 How is the hydrological system altered by past and present human use?
- 1.3 Where are existing buffers modifying the hydrological system?

2.0 How should biodiversity be described in the study area?
- 2.1 What are critical areas for biodiversity?
- 2.2 How is biodiversity altered by past and present human use?
- 2.3 Where are existing buffers modifying biodiversity?

Analysis Questions

Core Question
Is the landscape functioning well?

1.0 How is the hydrological system functioning in the study area?
- 1.1 What and where are potential sources of water quality problems?
- 1.2 What processes are triggering water quality problems?
- 1.3 How are existing buffers functioning in relation to the hydrological system?

2.0 How is biodiversity functioning in the study area?
- 2.1 Where and what are biodiversity problems and opportunities?
- 2.1 What processes are limiting biological diversity?
- 2.3 How are existing buffers functioning in relation to biodiversity?

Plan Development Questions

Core Question
How should the landscape be altered?

1.0 How should the hydrological system be altered to achieve desired future conditions?
- 1.1 Which buffer functions are necessary to alter the hydrological system?
- 1.2 What are the key characteristics of these types of buffers?
- 1.3 Where should these buffers be located?
- 1.4 Where are buffers ineffective in achieving cleaner water?

2.0 How should the landscape be altered to maintain and improve biodiversity?
- 2.1 Which buffer functions are necessary to improve biodiversity?
- 2.2 What are the key characteristics of these types of buffers?
- 2.3 Where should these buffers be located?
- 2.4 Where are buffers ineffective for improving biodiversity?

Plan Evaluation Questions

Core Question
What predictable changes might the landscape scenarios cause?

1.0 How will the landscape scenarios impact the hydrological system?
- 1.1 How will the scenarios affect water quality?
- 1.2 How will the scenarios affect water quantity?

2.0 How will the landscape scenarios impact biodiversity?
- 2.1 How will the scenarios affect species richness?
- 2.2 How will the scenarios affect species viability?

Figure 5. Example of Landscape Scale Riparian Assessment Questions

The framework and tools are currently being evaluated in a case study site at the National Arbor Day Farm in Nebraska City, Nebraska. During year 2001, the tools and framework will be tested and evaluated with an existing watershed planning group in Missouri. This evaluation with actual users and stakeholders will provide valuable feedback as we refined the tools and framework during the following years.

CONCLUSION

Through the application of a question-driven framework, planners will be better able to recommend more effective and efficient riparian land management decisions. Among the major advantages of this approach, it (i) provides specific, but flexible guidance for analyzing resources and developing plans, (ii) prevents issues from being overlooked, and it (iii) assists planners with planning and designing holistic management systems that simultaneously address multiple issues and scales.

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