

# A WATERSHED MANAGEMENT APPROACH TO LAND STEWARDSHIP

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## ABSTRACT

Because watershed management means different things to different people—even experienced watershed managers have differing perspectives—it is important to develop and present a perspective of watershed management that fosters understanding and appreciation of its contributions to land stewardship. Watershed management organizes and guides the use of land, water, and other natural resources to provide the goods and services demanded by society, while ensuring the sustainability of the soil and water resources. A watershed management approach to land stewardship incorporates soil and water conservation and land-use planning into a holistic and logical framework. This is necessary because people are affected by the interaction between water and other resources, and because people influence the nature and severity of these interactions when they use resources. Adoption of a watershed management approach to land stewardship is accomplished through the combined efforts of technically trained planners and managers, decisionmakers, locally led advocacy groups, and other concerned stakeholders.

## INTRODUCTION

Ask a land manager, stakeholder, and decision-maker what watershed management means, and you will likely hear three different perspectives. Because of the lack of a comprehensive, unified view of watershed management, it is important to develop and present a perspective that fosters understanding and an appreciation of its contributions to land stewardship. The perspective presented in this paper is based upon the following definitions and concepts (Brooks et al. 1992, 1994, 1997; National Research Council 1999; Neary 2000).

A *watershed* is:

- A topographically delineated area drained by a stream system;
- The total land area above some point on a stream or river that drains past that point;
- A hydrologic-response unit, a physical-biological unit, and a socioeconomic political unit for management planning; and
- A smaller upstream catchment that is part of a river basin (Brooks et al. 1992, 1994, 1997; National Research Council 1999; Neary 2000).

A *river basin* is a watershed on a larger scale.

For example, the Ohio River Basin, the Mississippi River Basin, and the Colorado River Basin include all of the watersheds that drain into the Ohio, Mississippi, and Colorado Rivers, and their tributaries, which all eventually flow into the ocean.

Some people erroneously believe that watershed management only concerns the biophysical interrelationships; however, it is much more. *Watershed management*:

Organizes and guides the use of land, water, and other natural resources on a watershed to provide the goods and services demanded by society, while ensuring the sustainability of the soil and water resources;

- Involves the interrelationships among soil, water, and land use, and the links between upland and downstream areas;
- Considers the connection between stream channel responses and the impacts caused by natural or human-related events on the surrounding watershed; and
- Involves socioeconomic and human-institutional interrelationships along with biophysical interrelationships.

Keeping the above points in mind helps to guide watershed management practices and identify the institutional mechanisms needed to implement a watershed management approach to land stewardship.

*Watershed management practices* are changes in land use, vegetative cover, and other nonstructural and structural actions conducted on a watershed to achieve ecosystem-based, multiple-use management objectives. Objectives of watershed management practices include:

- Rehabilitation of degraded lands;
- Protection of soil and water resources on lands managed to produce food, fiber, forage, and other products;
- Improvement of amenities, such as a landscape's aesthetic value;
- Enhancement of water quantity and quality; and
- Any combination of these objectives.

A watershed management approach to land stewardship incorporates soil and water conservation and land-use planning into a holistic and logical framework. This is necessary because people are positively and negatively affected by the interaction between water and other resources, and because people influence the nature and severity of these interactions when they use resources.

The effects of these interactions follow watershed, not political, boundaries—water flows downhill despite political boundaries. Activity on the uplands of one political unit affects other political units that occupy a downstream position in a watershed or river basin. Because these interactions disregard political boundaries, considering natural resource use on a broad, societal scale is important. A watershed management approach to land stewardship considers downstream or off-site effects by establishing watershed boundaries. When off-site effects exist, ecologically sound management becomes good economics if the costs and benefits of the management activities are distributed among the involved communities, political entities, and individuals.

### WHY A WATERSHED MANAGEMENT APPROACH TO LAND STEWARDSHIP?

Natural ecosystems are managed to improve the welfare of people within the confines of the practices of a watershed management approach to land stewardship. Watershed management activities maximize the sustainable use of natural resources and the equitable distribution of the benefits and costs, while minimizing social disruption and adverse environmental impacts (Gregersen et al. 1987; Brooks et al. 1992, 1994, 1997; Neary 2000). As a spatial unit of planning and management, a watershed highlights the physical aspects of the landscape. If the physical aspects of the landscape are not recognized, natural resource loss, ecological dysfunction, environmental degradation, and difficulty implementing watershed management interventions might result. A watershed unit contains the links and issues that must be considered during future land stewardship (National Research Council 1999).

Even if the land stewardship effort focuses on water resources, forestry activities, livestock production, or agriculture, the following points illustrate the importance of a watershed management approach to land stewardship.

- A watershed is a functional area of a landscape that includes the key interrelationships and interdependencies for management of land, water, and other natural resources.
- A watershed management approach evaluates the biophysical relationship between upstream and downstream activities, which enables planners, managers, and decisionmakers to identify and evaluate effective land stewardship methods. The complexities of biophysical, economic, social, and institutional factors that allow development of sustainable management programs are considered.
- Using the watershed as a unit of management is economical because a watershed internalizes the off-site effects involved with land stewardship.
- A watershed unit permits both upstream and downstream assessment of environmental impacts, including the effects of land-use activities on large and small ecosystems. Consequently, the effects of upland disturbances, which result in a chain of downstream consequences, are easily examined and evaluated within a watershed context.
- A watershed management approach considers human interactions with the environment.
- A watershed management approach efficiently integrates other natural resource conservation and development programs, e.g., soil and water conservation, forestry, farming systems, and rural and community development.
- A watershed management approach considers natural ecosystems and social systems, in contrast to earlier approaches that focused either on natural ecosystems and ignored the social systems or on social systems and considered the natural ecosystem as a constraint (Gregersen et al. 1987, Quinn et al. 1995, Brooks et al. 1997, Neary 2000).

### ADOPTION OF A WATERSHED MANAGEMENT APPROACH TO LAND STEWARDSHIP

Some barriers to the adoption of a watershed management approach to land stewardship are actual, while others are perceived (Brooks et al. 1992; Quinn et al. 1995; Ffolliott et al. 2000, 2002). The combined efforts of technically trained planners and managers, decisionmakers, locally led advocacy groups, and other concerned stakeholders are overcoming both real and imagined obstacles to a watershed management approach to land stewardship.

#### Existing Barriers

The concepts underlying a watershed management approach to land stewardship partially explain why this approach has not been more widely adopted (Gregersen et al. 1987, Brooks et al. 1992, Quinn et al. 1995, Ffolliott et al. 2002). Watershed management practices that are implemented by one

political unit often affect those living outside and especially downstream of the implementing political unit. Consequently, there is often little incentive to adopt a watershed management approach that could create a conflict situation.

The initiating political unit has had little incentive to implement a watershed management approach because those living outside that political unit often experience the impact of the watershed management practices. Questions commonly asked by upstream land users illustrate the complexity of the situation: Why should we implement watershed management practices that primarily benefit downstream users? Why do decisionmakers expect us to implement a watershed management approach that considers people downstream if we are not compensated for the costs? To gain the support necessary to adopt a watershed management approach to land stewardship, the inequities of who pays for and who benefits from a watershed management practice must be resolved.

Other barriers to a watershed management approach to land stewardship include:

- A lack of awareness or understanding about the concepts and practices of watershed management by the planners, managers, and decisionmakers who are responsible for land stewardship and by the public;
- A need for trained watershed managers to explain the nature of a watershed management approach to administrators, decisionmakers, and the public adequately;
- Skepticism and limited quantitative information about the downstream benefits of watershed management because the process used to evaluate and monitor the effectiveness of watershed management is inadequate;
- Limited understanding about the difference between the human-caused effects of land-use practices and those caused by natural processes;
- Unrealistic expectations about the results of watershed management interventions; and
- A lack of technical expertise about how to plan, implement, and monitor watershed management programs.

Technical experts are attempting to illustrate how watershed management can help land stewardship efforts focus on securing the flows of natural and economic resources. However, this effort should include evaluating the investment, employment, and income opportunities and maintaining environmental quality, within a sustainable framework.

Erosion, sedimentation, and flooding occur naturally, regardless of human activities. However, human activities on watershed lands affect the frequency and severity of these processes. For example,

excessive livestock grazing might influence the occurrence of flooding and sediment deposition.

Watershed management implemented to reduce the accumulation of sediment in downstream reservoirs appears unsuccessful if natural erosion-sedimentation processes are not noted. Specifically, the amount of the watershed area affected by the practices, the proximity to a reservoir, existing levels of sediment in the stream channels, and other current land uses should be considered. Early involvement of professionals who are experienced in the disciplines embedded in watershed management, such as hydrology, geology and soil science, forestry and rangeland management, and agronomy, helps to meet the goals of a watershed management program successfully.

### Overcoming the Barriers

The barriers to the adoption of a watershed management approach to land stewardship are slowly being eliminated. Most of the planners, managers, and decisionmakers who are concerned about future land stewardship issues recognize the importance of environmentally healthy, sustainable use of natural resources (Gregersen et al. 1987; Brooks et al. 1992, 1994; Quinn et al. 1995; Ffolliott et al. 2002). However, ignoring naturally occurring boundaries and interrelationships will lead to serious consequences.

A “cure all” watershed management formula that would effectively replace current land-use practices does not exist. Further, development of natural and economic resources within a watershed management framework does not mean that associated projects, programs, and activities should be the sole responsibility of watershed managers. Instead, watershed managers should be integral components in development programs that focus on water resources, forestry, agriculture, and related land and resource uses (Ffolliott et al. 2000, 2002). To be effective, land-use administrators, water resource managers, foresters, agriculturalists, in conjunction with watershed managers, must practice watershed management activities.

Overcoming the barriers to a watershed management approach to land stewardship requires responsible government agencies and locally led partnerships, councils, corporations, and other institutions to:

- Increase stakeholder awareness about the importance of sustainable land use and the relationships that are the basis of watershed management, including the biophysical realities and economic, social, and cultural factors that affect land use on watershed lands;

- Identify upstream and downstream stakeholders in any watershed-use issue, and determine their perceptions and motivations;
- Clarify agency or institutional jurisdiction over watershed management activities, and improve coordination. This is especially significant because often multiple entities are responsible for natural resource management on a watershed scale;
- Facilitate the local management of upland natural resources by residents on watersheds that are privately owned or controlled;
- Fairly distribute the benefits and costs associated with upland natural resource use and watershed management practices between the upland and downstream land users and other stakeholders; and
- Assess the short- and long-term impacts of watershed management practices to encourage and improve continued application. A feedback mechanism for this assessment should identify whether production activities and the soil and water resources on which these activities depend are sustainable under the current policies.

## SUMMARY

The perception of watershed management has changed throughout the twentieth century (Neary 2000). Watershed management, at the beginning of the century, was concerned about the development and maintenance of water supplies. However, today the scope and application of watershed management is comprehensive and depends upon all the involved parties understanding the components of watersheds, and their interactions, not just the manipulation of the physical processes (Reimold 1998). The goals of watershed management are to assess the effects of current and anticipated future land uses on soil and water resources, determine the potential ecological and social impacts of these land uses, and provide comprehensive solutions to watershed problems. Achieving these goals depends upon the expertise provided by watershed management professionals.

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