DIVISION OF AGRICULTURE
RESEARCH & EXTENSION
University of Arkansas System

Agriculture and Natural Resources

FSA3129

Strategies for Livestock Management in Riparian Zones in Arkansas

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Arkansas is rich in surface water resources that provide drinking water for communities, irrigation for agriculture, means of transport and recreation. The areas around these water bodies are called riparian zones that are vital for providing ecological services. The long-term quality of our water bodies is greatly influenced by the understanding of how riparian zones function and how agricultural practices affect them.

Definition of Riparian Zones

Riparian zones are natural vegetated corridors adjacent to streams that build the transition zone between aquatic and upland ecosystems. These zones develop around surface water bodies and have important functions – filter sediments and pollutants, regulate flow rate during rain events, recharge groundwater and maintain stability of streambanks.

For many livestock producers, riparian zones are economically important, as forage quantity and quality at times tend to be greater in these areas than on upland pastures, and access to water for cattle is a cost-effective measure. In the past, there seemed to be a conflict between protection and utilization of these areas by livestock. In recent years, however,

Figure 1. Typical situation if animals are given unlimited access to intermittent streams and creeks.

Figure 2. Volunteer vegetation establishing on streambanks after a few months of animal exclusion.

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the ecological importance of riparian zones has been recognized to a much greater extent. If managed properly, riparian zones can protect waterways and simultaneously enhance forage supplies.

Riparian Zones and Water Quality

Riparian areas serve a variety of functions that help maintain good water quality. Some major functions are summarized here.

I. **Deep-rooted riparian vegetation helps maintain streambank structure by holding soil in place and slowing the erosive power of water flow.** Through reduced erosion, smaller amounts of sediment are transported away, which helps keep fish habitat clear while minimizing nutrient losses.

II. **Riparian vegetation filters runoff and reduces the amount of sediments and nutrients reaching the stream.** Nutrients that are transported in from high-lying areas can be taken up by plants growing in the riparian zone.

III. **Riparian vegetation provides shade and thus helps regulate water temperature by controlling solar radiation.** Algae growth is limited in shaded water bodies due to reduced solar radiation. Woody debris can help create spawning areas for fish. Debris of smaller size, such as twigs and leaves, provides a food source for many aquatic organisms.

IV. **Riparian vegetation helps reduce stream velocity that, in turn, helps reduce bank erosion and sediment loss.**

V. **Riparian zones are considered travel corridors for wildlife and will increase habitat quality for a host of wildlife species.**

Livestock Management

There are many management options to improve the functionality of riparian zones through proper livestock management. Even in cases where riparian zones have been degraded to a high degree, vegetation will reestablish itself soon after stress factors, which diminished vegetation in the first place, have been removed. Complete livestock exclusion is an effective way to let bank vegetation recover; however, adoption has been poor due to various reasons, and there are other opportunities to achieve good results.

Streambank Crossings and Partial Livestock Exclusion

In many instances, intermittent streams cross pasturelands or serve as property boundaries. These streams drain pastures and serve as tributaries for larger bodies of water – rivers or lakes – further downstream. Therefore, any kind of water quality impairment occurring at that level should be avoided. Good grazing management is especially important whenever paddocks are intersected by any kind of larger drainage channel.

Often, cattle are given the opportunity to cross wherever, but establishing well-built, solid stream crossings is preferred in the long run. One of the simpler solutions for such a crossing is to cover the stream bottoms with coarse gravel at specific crossing sites that prevent further channel erosion and to exclude cattle from sites along the stream that are already heavily eroded. In doing so, temporary fences made of poly- or high-tensile wire can be set up relatively inexpensively and allow for flexibility once these fences have to be moved.

Another type of livestock crossing is comprised of an approximately 8-foot wide concrete slab that is lined with large rocks on either side. These rocks prevent cattle from walking into the stream while catching debris and sediments during runoff events. More expensive designs of crossings consist of plastic webbing structures filled with gravel that line the stream bottom.

Fencing of streams is recommended whenever degradation has reached a point where temporary or, for some stream sections, permanent livestock exclusion is warranted. One management strategy is one-sided exclusion of a stream with a temporary fence. This will allow cattle access on one side but will discourage animals from walking through the entire stream. Therefore, the fence should be placed close to the edge of the streambank. To make this option workable, livestock needs to be rotated frequently to avoid overuse of one or the other side of the streambank.

Two-sided fencing is a second management strategy and is recommended when bank damage has progressed to an extent that only exclusion will render sufficient soil protection and vegetation recovery. In this case, cattle can still be given access infrequently to take advantage of forage growth occurring inside the fenced area.

Off-Stream Watering

Providing watering devices off-stream has been shown to be an effective alternative to stream access. Options including a nose water pump have been shown to be effective in providing clean water to animals while avoiding trampling of streambanks. Furthermore, when given the choice, cattle drank from an off-stream water trough 92 percent of the time vs. the time spent in the creek. During the period of the study, streambank erosion was reduced by 77 percent, total suspended solids by 90 percent, total nitrogen by 54 percent and total phosphorus by 81 percent. During typical hot Arkansas summers, cattle may still prefer the cooler stream areas.

Nutrient transport into streams from feces should be avoided, however. Time spent by cattle in streams can be minimized by providing shade located away from streams. If no other option is available than watering cattle in streams, access points should be protected with gravel similar to a stream crossing so that cattle do not linger, trample banks or otherwise destroy the channel structure.

Grazing Management in Riparian Zones

Total livestock exclusion may provide the quickest results in terms of vegetation recovery in eroded riparian zones, but appropriate grazing management can greatly reduce negative impacts in riparian zones. In general, grazing management that has negative effects on soil stability and soil compaction should be avoided. Grasses and forbs can be grazed in riparian areas as long as an approximate minimum canopy height of 4 inches is maintained. While most producers will have to decide on grazing practices for cattle, an increasing number of farmers own goats and sheep, which have different grazing habits than large ruminants. Goats are browsers and can select individual leaves and strip bark of woody plants. Sheep graze close to the ground and tend to do less damage in riparian areas, since these animals do not congregate in low-lying areas where they feel vulnerable to predation.

Riparian zones should be grazed whenever conditions allow for minimized environmental impact. The following recommendations should be considered whenever livestock are utilized to graze riparian vegetation:

- **Monitor** soil moisture content close to streams. If moisture content is high, soil is more sensitive to compaction resulting in increased runoff following precipitation events.
- **Graze** grass swards to a canopy height no less than 4 inches.
- **Avoid** moving cattle to riparian zones during hot summer days. Cattle will linger in streams and may damage streambanks.
- **Avoid** cattle grazing during periods of flowering of native grass species.
- **Avoid** excessive grazing of woody species that build the underbrush in a riparian ecosystem.

Grazing methods utilized depend on the situation, but rotational stocking will likely be more beneficial from an environmental standpoint than continuous stocking. Further, other methods such as strip grazing can be used to move cattle through sensitive areas quickly. Creep grazing can be used to give calves access to lush vegetation that usually develops in riparian zones due to generally higher soil moisture in these areas.

Summary

Riparian zones have important ecological functions regarding maintaining and protecting water quality, wildlife habitat and recreational opportunities. These areas may also provide a substantial source of forage if managed in a sustainable manner that avoids negative environmental effects. Grazing animals in riparian zones should be managed site-specific while taking into consideration time of year, stage of vegetation growth, history of precipitation events and livestock needs and behavior. If livestock is managed properly, forage resources present in riparian zones can be used effectively while preserving the integrity of the riparian ecosystem. Good grazing management using appropriate grazing methods will likely result in positive outcomes that will benefit both farm economics and the environment.

Printed by University of Arkansas Cooperative Extension Service Printing Services.

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FSA3129-PD-7-2015RV

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