Monitoring Series No. 4

California Rangelands Research and Information Center

MONITORING PRACTICE EFFECTIVENESS: WHAT, WHERE AND HOW

Melvin George, Extension Range and Pasture Specialist, Agronomy and Range Science Dept., University of California, Davis.

Effectiveness Monitoring

Effectiveness monitoring is used to assess whether a particular activity had the desired effect. Effectiveness monitoring can be used to evaluate a single practice or a group of practices applied to achieve a particular objective. When objectives are stated so that they are measurable it is not difficult to figure out what to monitor.

Measurable Objectives

What to monitor depends on management objectives that are measurable. Lack of measurable objectives is a common problem in natural resource projects. Every objective should be measurable and describe a successful endpoint. Otherwise it is just a nebulous goal. Here is an example: ***"The objective of the project is to enhance the riparian corridor within the project area through the development of a riparian pasture, along with conifer and willow planting.*** " This objective statement is not measurable. It does not define enhancement. It does not tell what constitutes successful completion of the project. You can not tell what to monitor to determine project progress and success.

Let's try to improve the above objective statement by answering some questions about the project. Enhancing the riparian corridor is a common project objective. Without knowing what constitutes enhancement it is difficult to state measurable objectives. Is it your objective to have more canopy cover, more pools, stabilized streambanks or more streamside vegetation? Once you decide what constitutes enhancement you need to quantify the objective(s).

For example, if the objective is more canopy cover you need to answer the following questions:

- How much do I have now?
- How much do I want or need?
- How much will mother nature allow me to have? In other words, is it within the ecological potential of the site or corridor to have more of what you want or have you already reached the site's potential for canopy cover?

Repeat these questions for each enhancement that you wish to accomplish. Once these objectives are clearly stated with measurable criteria for completion we can move on to the selection of appropriate practices for achieving objectives and we can decide what and how to monitor. Here is an example: "***The objective of this project is to increase canopy cover from 50 percent to 75 percent and to reduce unvegetated streambanks from 15 percent to 5 percent of the streambank area." Based on comparisons to other stream reaches and nearby streams we believe that this objective is within the ecological potential of this riparian/stream system.*** Now I know that I need to monitor canopy cover to determine progress toward 75 percent canopy cover and I need to monitor the area of bare soil along the streambank in the project area.

The following table suggests several ways to monitor for various management objectives and practices.

General Objective	Enhances Watersheds (water quality and quantity) by....	Measurable Objective Statement	Monitor by taking (before, during, after) photos of.....	Monitoring by estimating or measuring...	Practices
PRESCRIBED GRAZING					
Grazing management maintains adequate ground cover, rdm or stubble height in uplands	...leaving adequate ground cover in uplands to intercept rainfall, impede and filter overland flow, and reduce erosion and siltation.	Grazing will be managed so that 1000 lbs/a of residual dry matter remains at the end of the summer-fall dry season	Photograph ground surface at end of grazing season.	Ground cover Residual Dry Matter Stubble Height	Livestock Distribution Practices Prescribed Grazing Proper Stocking Rate
Grazing management maintains adequate ground cover, rdm or stubble height in riparian zones	...leaving adequate ground cover in riparian areas and along streambanks will reduce stream velocity, resulting in trapping of sediment, reduced streambank erosion and channel down cutting, and promote streambank revegetation.	Grazing will be managed so that a minimum 2 inch stubble height will be maintained throughout the grazing season.	Photograph streambanks and adjacent riparian areas.	Ground cover Stubble height Greenline	Livestock Distribution Practices Prescribed Grazing
Grazing management prevents overuse of woody plants in riparian zones.	...leaving adequate canopy cover and root mass to stabilize stream banks.	Grazing will be managed so that livestock do not browse woody plants during the last six weeks of the growing season.	Photograph streambanks and adjacent riparian areas	Canopy cover	Livestock Distribution Practices Prescribed Grazing

STRUCTURAL IMPROVEMENTS					
Install a gradient stabilizing structure to partially block stream flow and form a pool.	...reducing stream velocity, trapping sediment, reducing streambank erosion and channel cutting, and promoting streambank revegetation.	The objective of the structure is to trap sediment which will revegetate naturally during the first few years of the project and reduce the extent of bare streambanks. The project will be considered a success if the extent of bare streambanks changes from 15 percent to less than 5 percent.	...profiles of representative streambanks.	Stream channel cross-section area, width:depth ratio Streambank Stability Depth of silt behind structures	Grade stablization
Install cut-tree riprap to form barriers along streambanks	...impeding streamflow and velocity along the banks; reducing erosion, channel cutting, and bank failure; reducing siltation, promoting revegetation of streambanks to further trap sediment; reducing compaction and trampling by livestock in riparian areas.	The objective of this practice is to increase streambank stability as indicated by reduced bare ground and increased ground and canopy cover.	...treatment areas, providing an oblique view of problems sites	Bare ground Ground cover Canopy cover	Cut-tree rip rap

LAND TREATMENTS					
Brush control to increase forage, improve habitat, reduce fire hazard and reduce transpiration.	...reducing transpiration, allowing grasses or other ground cover to increase so that they can impede and filter overland flow, and increase their root density to hold soil.	Brush control will reduce shrubs from 65 percent of the canopy cover to 30 percent and increase forage production from 700 lb/acre to 2000 lb/acre. Shrubs will be left in canyons and in steep rocky areas to provide cover for wildlife.	Photograph canopy cover before and after brush control. Photograph annually for first five years and every three years after that to document shrub increase following control.	Canopy Cover Ground Cover Forage Yield Forage Quality	Prescribed Fire Mechanical Chemical Seeding
Seed desired species to increase forage productivity and quality, lengthen green forage season, and increase ground cover.	...increasing ground cover that will impede and filter overland flow and increase root density to hold soil.	Increase forage productivity from 1200 lb/acre to 2400 lb/acre. Increase ground cover from 40 percent to 80 percent. Lengthen the green season by two weeks by providing forage earlier in the fall. Increase native grasses from 5 percent of the ground cover to 20 percent of the ground cover.	Photograph the ground surface and field to show increase in seeded species. Photograph drill rows. Photograph ground surface to show ground cover. Time stamped photos to show early green feed. Photograph successfully established native species.	Forage Yield Forage Quality Ground Cover Seedling Density	Seeding Fertilization Brush and Weed Control

LIVESTOCK MANAGEMENT					
Herd health program improves resistance of livestock to disease and reduces number of animals shedding pathogens	...reducing the risk of impairing the beneficial uses of water intended for domestic use.	Reduce pathogen loading below quantitative or narrative standards.	Hard to monitor with photos.	Fecal coliforms Giardia spp. Cryptosporidium Not recommended. Cost of water testing can be prohibitive.	Vaccination Internal parasite control Nutrition
Cull individuals that spend large amounts of time in riparian areas or other environmentally critical areas.	...reduces time livestock spend in riparian/stream systems reducing overgrazing of streamside vegetation, trampling of streambanks and deposition of wastes in stream.	Reduce time livestock spend in riparian area from mid July to mid October by 60 percent.	Photo monitoring probably not practical	Head-days spent in riparian/stream system.. Stubble Height Trampling	Culling