Figure 34-31. A small dam, terraces, buffer strips, and grass plantings are designed to improve the quality of water entering a lake.
Photo courtesy of USDA NRCS.

Thus, the effect of remedial measures on the contributing watershed will be slow for many cases of poor water quality. Therefore, immediate action may be needed to reduce future problems.

Integrated Nutrient Management

Farm N inputs can usually be more easily balanced with plant uptake than can P inputs, particularly where CAFOs exist. In the past, separate strategies for either N or P have been developed and implemented at farm or watershed scales. Because of different critical sources, pathways, and sinks controlling N and P export from watershed, remedial efforts directed to either N or P can negatively impact the other nutrient. For example, basing manure application on crop N requirements, thus minimizing nitrate leaching to groundwater, can increase soil P and enhance potential surface runoff losses. In contrast, reducing surface runoff losses of P via conservation tillage can enhance N leaching.

These positive and negative impacts of conservation practice on resulting water quality should be considered in the development of sound remedial measures. Clearly, a technically sound framework must be developed that recognizes critical sources of N and P export from agricultural watersheds so optimal strategies can be implemented at farm and watersheds scales to best manage both N and P. An example of this principle can be seen in Figure 34-15d.

...critical sources of N and P export from agricultural watersheds [must be recognized] so optimal strategies can be implemented ... to best manage both N and P.

Summary

The overall goal of efforts to reduce P losses from agriculture should be to balance off-farm P inputs in feed and fertilizer with outputs in products while managing soils in ways that maintain productivity. Source and transport control strategies can provide the basis to increase P use efficiency in agricultural systems.

...all fields do not contribute equally to P export from watersheds.

Future advisory programs should reinforce the fact that all fields do not contribute equally to P export from watersheds. Most P export comes from only a small portion of the watershed as a result of relatively few storms. Although soil P content is important in determining P concentration in agricultural runoff, surface runoff and erosion potential will often override soil P levels in determining P export. If water or soil does not move from a field or below the root zone, then P will not move. Clearly, remedial efforts will be most effective if targeted to the hydrologically active source areas in a watershed that operate during a few major storms.

Manure management recommendations must be tailored to site vulnerability to surface runoff and erosion as well as soil P content, because not all soils and fields have the same potential to transfer P to surface runoff and leaching. As a result, threshold soil P levels should be indexed against P transport potential with lower values for P source areas than for areas not contributing to water export.

Phosphorus applications at recommended rates can reduce P loss in agricultural runoff via increased crop uptake and cover. It is important that management practices be implemented that minimize soil P buildup in excess of crop requirements, reduce surface runoff and erosion, and improve capability to identify fields that are major sources of P loss to surface waters.

Overall,

- Management systems should attempt to balance P inputs and outputs at farm and watershed scales.
- Source and transport controls should be targeted to identify critical source areas of P export from watersheds.
- Threshold soil P levels that guide manure applications should be linked with site vulnerability to P loss

...remedial efforts will be most effective if targeted to the hydrologically active source areas in a watershed...

Manure management recommendations must be tailored to site vulnerability to surface runoff and erosion as well as soil P content...