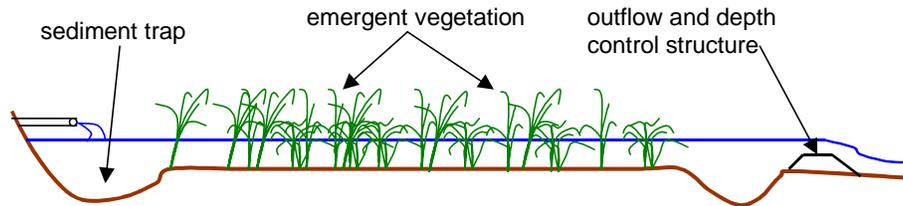




Vegetative Treatment Systems for Water Quality Improvement



GOAL

Reduce water column concentrations of nitrate, suspended sediment, sediment bound nutrients, biological oxygen demand, pesticides and heavy metals.

TARGET

Irrigation tailwater, tile drainage, wastewater, rinsewater

CONSTRAINTS

Method should be cheap, low maintenance, effective and compatible with current cropping systems

WHAT IS IT?

A shallow, vegetated pond or channel that drainage water flows through slowly over a period of two or more weeks

HOW DOES IT WORK?

The water passes through a variety of natural chemical conditions, which promote reactions that break down or immobilize pollutants. Submerged vegetation provides surface area that catalyzes these reactions and hosts beneficial bacteria.

HOW WELL DOES IT WORK?

Each situation is unique and removal efficiencies depend on several factors. A 14-day retention time may remove over 95% of nitrate, ammonium and orthophosphate¹. In one study 95-98% of diazinon was removed after about 60 days². Effectiveness increases as the system ages and varies seasonally, with best results in warm weather. Good results have been had in many locations in the midwest.

IS IT DIFFERENT THAN A GRASSED DITCH?

The key difference is that flow control structures such as low dams maintain a water depth of about 1½ feet and a detention time of 2 or more weeks. Plants adapted to standing water are used in addition to grass.

HOW DO YOU RETROFIT AN EXISTING DITCH?

Clean the ditch to provide capacity for both plants and water if the ditch will carry winter stormwater. In some cases only the ditch culverts require cleaning. In some cases the ditch must be widened to allow sufficient detention time. Add sediment traps at culverts. Add flow control structures such as low dams made of wood, earth or rock to achieve water depths between 1 and 2 feet throughout the ditch. Smooth the banks and prepare a seed bed. Vegetate the channel with seed or transplants. Manage weeds while desired plants establish.

WHAT DOES IT COST?

Initial costs include excavation, flow control structures and vegetation. Retrofitting an existing ditch can cost between \$2 and \$20 per linear foot, depending mostly on excavation costs. Maintenance costs include: Clean sediment traps as needed. Mow vegetation about every year or two.

WHAT PLANTS ARE USED?

Non-weedy native emergent and aquatic plants are selected based on the soil, climate and water salinity. Banks are seeded with native grasses to exclude broadleaf weeds. These natives thrive without becoming weedy. Non-native perennials are to be avoided as they adversely impact downstream natural areas.

IS FLOODING A PROBLEM?

If storm water is directed through the system, it must be sized to prevent excessive flooding. Capacity may be increased by increasing the ditch width, sloping back the sides and improving culverts. Alternatively, flashboard weirs can be used as dams. Removing the flashboards in the winter increases ditch capacity for winter runoff.

IS ASSISTANCE AVAILABLE?

The Resource Conservation District of Monterey County, the Santa Cruz County Resource Conservation District and your local office of the Natural Resources Conservation Service are available to provide free technical assistance.

¹ Crites, R. and G. Tchobanoglous, 1998. Small and Decentralized Wastewater Management Systems. McGraw-Hill. p. 595.

² Tsukano, Yutaka, 1986. Transformations of selected pesticides in flooded rice-field soil – A review. Journal of Contaminant Hydrology, 1, pp. 47-63.

