Auburn University and USDA/Natural Resources Conservation Service

Alabama Aquaculture Best Management Practice (BMP)

Erosion Control on Watersheds and Pond Embankments

BMP No. 3

Definition

Erosion in the pond watershed, sides and tops of pond embankments, emergency spillways, farm roads around the pond, access roads to the farm, and stream crossings increase suspended solids concentrations and turbidity in pond waters. Control of erosion on watersheds and embankments can reduce the input of solids to ponds, minimize turbidity, and lessen concentrations of suspended solids in effluents. This will protect in-stream water quality.

Explanation

Erosion from soil surfaces results from the kinetic energy of raindrops and flowing water. Raindrops dislodge soil particles, and runoff flowing downslope can suspend and transport the loose particles. A high concentration of suspended clay particles in runoff will increase turbidity, and clay particles require an extended period to settle out of water.

Runoff collects into progressively larger channels as it moves downslope. The energy of flowing water can cause downcutting of the land resulting in gullies. Bare soil erodes easily, and loose soil has a greater potential for erosion than tight soil. Erosion potential also increases with steeper slope.

Areas of bare soil may occur on catfish pond watersheds, and some watersheds may exhibit gully erosion. Farm roads often are subject to erosion. Tops of embankments and dams may be used as roads, and heavy traffic encourages erosion.

Livestock make paths on watersheds, and grass does not grow in these areas. Paths are highly erodible, and they serve as small channels that may eventually grow into gullies. Livestock traffic also can expose bare soil at pond edges, on dams and embankments, and at ditch crossings. If cattle wade in ponds, they will suspend sediment and increase turbidity. Pond dams and embankments are steep and heavy rains can cause severe erosion on both dry and wet sides.

Erosion control on watersheds, roads, dams, and embankments involves protecting the land surface from raindrops and flowing water. Protecting all soil surfaces with vegetation, stone, or other structural practices can do this. Plant cover lessens erosion in several ways. Foliage intercepts raindrops and prevents them from impacting the soil directly. Vegetation on the land surface offers some resistance to water flow and reduces the velocity of runoff. Vegetation also protects the soil from direct contact with the flowing water. Plant roots bind soil to strengthen it against the impact of falling or flowing water. Moreover, vegetation and ground cover reduce uncontrolled transport of nutrients from fertilizer and other sources.

For counties to participate in the flood insurance program of the Federal Emergency Management Agency (FEMA), flood plain blockage must not cause an additional rise of over 1 ft. in flood water levels. Encroachment of structures such as ponds on flood plains cause depth and velocity of flood water to increase, resulting in increased erosion in the stream channel and floodway. Therefore, it is important to limit flood plain blockage by aquaculture ponds. NRCS recommends that 40-50% of the owner's 100-year flood plain area around the stream channel be left open.

Prevention of Erosion

Practices

The following practices should be used to prevent erosion:

- *Control erosion on watersheds by providing vegetative cover, eliminating gully erosion, and using diversions to route water from areas of high erosion potential.*
- *The practice of rearing livestock near ponds and allowing livestock to walk on embankments and enter ponds should be discouraged.*
- *Eliminate steep slopes on farm roads and cover these roads with gravel – especially those roads built of soil of high clay content.*
- *Use 3:1 (horizontal:vertical) or flatter side slopes for pond embankments in new construction.*
- *Provide grass cover on sides of pond dams or embankments and grass or gravel on tops of dams or embankments.*
- *New ponds or extensions of existing ponds should be constructed to maintain 40-50% of the owner's 100-year flood plain area near the channel.*

Implementation notes

Watersheds should be examined and gullies, places with bare soil, soil with high clay content, or sparse vegetation, and other potential sites for erosion identified. Gullies should be stopped by shaping the sides, filling them with soil, and constructing a grade control structure if necessary. Grass or other vegetative cover should be established on all areas of bare soil. Diversions may be used on some watersheds to route water away from steep slopes or other areas of high erosion potential (See USDA-NRCS Alabama Conservation Practice Standard, Code 362 - Diversion).

Livestock are not recommended in watersheds of catfish ponds. Nevertheless, eliminating cattle from pond watersheds is not realistic, for many farmers consider the cattle essential. However, if exclusion from watersheds is not feasible, electric fences should be installed to restrict livestock from ponds.

Grades greater than 10% should be avoided on farm roads, and roads should follow contours (See USDA-NRCS Alabama Guide Sheet No. AL 655). A 2- to 3-inch layer of gravel should be applied on farm roads (See USDA-NRCS Alabama Guide Sheet No. AL 561).

Grass cover should be established on the entire dry side of embankments and above the water level on the wet side. Common pasture grass can be used on the dry side to control erosion. Halifax maiden cane and canary reed grass are suitable plants for preventing erosion on wet sides.

The tops of embankments not routinely used as roads should be covered with grass. Embankment tops subject to regular traffic should be covered with a 2- to 3-inch layer of gravel (See USDA-NRCS Alabama Guide Sheet No. AL 561). This will prevent erosion and allow embankment tops to serve as all-weather roads.

References

USDA-NRCS AL Guide Sheets No.
Al 655 – Erosion Control on Forest Land.
AL 561 – Heavy Use Area Protection.

USDA NRCS AL Conservation Practice Standards
Code 362 – Diversion
Code 410 – Grade Stabilization Structures
Code 560 – Access Road
Code 728 – Stream Crossing

Yoo, K. H. and C. E. Boyd. 1994. Hydrology and Water Supply for Pond Aquaculture. Chapman and Hall, New York, New York.

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