

Erosion & Sediment Control in the Virgin Islands

What is the biggest polluter of V.I. waters, coral reefs and sea grass beds?

...Soil running off of bare ground known as **SEDIMENT**.

Sediment can come from construction sites, dirt roads, roadsides, unpaved parking areas, or cleared farmland. To help solve this problem, the UVI Cooperative Extension Service (CES) started a demonstration project to introduce new erosion and sediment control (ESC) practices. The project's goals were to show how these practices should be properly used and to learn how well they work in the Virgin Islands.

STABILIZING SLOPES WITH PLANTS CES Home Demonstration Garden Plots

CES planted both native and exotic ground covers in the St. Thomas Home Demonstration Garden. In the first trial planting, staff planted native species like *talinum*, *inch plant*, *spider lily*, as well as exotics like *sunrose* and *ground orchid*. We also planted a row of *vetiver* grass along the bottom of the slope to form a living terrace as sediment builds up behind the grass.



Talinum ground cover.

CES evaluated growth, soil cover and survival rates during a six-month period. With occasional watering, *talinum*, *inch plant*, *spider lily*, *ground orchid* and *vetiver* spread easily. *Sunrose* did not spread well and died during the dry period. *Talinum* and *inch plant* spread and covered the largest area within six months. *Ground orchid* did not provide enough ground cover and was taken over by weeds. Native plants out-performed exotics in this trial.

In a second trial, we planted exotic plants *lantana*, *mini rhoeo*, *purple queen*, *wandering jew*, *blue daze*, *purslane* and "*jump-up-and-kiss-me*."

Hydroseeding Grasses

Hydroseeding is an erosion and sediment control practice that rapidly covers bare soils with grass and mulch. Grass seed, water, and mulch are mixed in the hydroseeder tank and then sprayed on bare soils with a hose. CES used hydroseeders to seed steep slopes on St. Thomas and St. Croix. Grass seed hydroseeded included: bermuda, rye, fescue and bahia (a drought-tolerant grass species native to the V.I.) as follows:

- C Bahia grass: behind the UVI St. Croix cafeteria and outdoor sport facility.
- C Bahia and bermuda grass: on steep, south-facing slopes at the Cost-U-Less construction site, St. Thomas, with cellulose (paper) fiber hydromulch, and a soil binder.
- C Bahia grass: on a steep slope with cellulose hydromulch and a soil binder at a site in Estate St. George's Hill, St. Croix.



Hydroseeding bahia grass at the UVI St. Croix Cafeteria.

enough water to grow and were burnt by the hot sun.

Bahia grass hydroseeded at the St. Croix sites was quickly overgrown by guinea grass. However, bahia grass seed that was hand broadcast and then covered with erosion control mats sprouted and spread.

EROSION CONTROL MATS

Erosion control mats are natural or man-made fibers woven together to form a mat or blanket, and backed with plastic netting. They are used to cover bare soils or slopes during construction or until grass or other plants can become established. We used different types of mats in this project to find out:

- C How well they prevented erosion,
- C How well they promoted plant growth, and
- C How long they lasted.

Donoe Housing Community

CES worked with the VI Housing Authority (VIHA) to stabilize bare slopes at the Donoe Housing Community, St. Thomas, with erosion control mats. We installed 70% straw/30% coconut fiber and 100% straw fiber erosion control mats on steep (>60%), stony, dry, bare slopes along the Donoe Road.

The bermuda and bahia grass seeded at the Cost-U-Less site sprouted and are growing well on the shady slopes. The grass seeded on unshaded slopes died because the seedlings did not get

VIHA grounds crew cleared brush, debris, stones and stumps, raked to smooth the slope surface, and installed the matting. Coconut/ straw mats were used for the steepest sections and straw mats were used



CES & VIHA staff install erosion control mats at Donoe Housing Community.

for less steep sections. Mats were installed around ornamental plants (ginger thomas, pink cedar and bougainvillea) that were kept on the slope during the clearing process.

CES Workshop Demonstration Installations

At the St. Thomas Cost-U-Less construction site, workshop participants hand-seeded the overflow swale from a sediment retention pond with bahia grass and then laid a coconut/straw mat over the seeded area.

At the St. Croix site, trainees first seeded the bare slope with bahia grass and then covered one area with excelsior mats. They covered an adjacent area with hay mulch to compare how well the two practices controlled erosion and how long the materials lasted.



Workshop participants install excelsior erosion control mat on St. Croix.

Erosion Control Mat Results

All three types of erosion control mat (straw, straw/coconut, coconut, and excelsior) reduced erosion from the demonstration sites before breaking down. Some findings to consider when using erosion control mats are:

- C Shallow depth to rock can make anchoring the mats difficult.
- C Stony soils and tree roots also make it very difficult to keep the material flat against the slope.
- C Mats help hold water in the soil, which increases weed growth (especially guinea grass and tan tan).

The mats at all sites have broken down. The straw/coconut fiber mats lasted the longest, taking about six months to break down. The excelsior mat installed on St. Croix broke down after only 2 ½ months.

STRUCTURAL PRACTICES

Silt Fencing

Workshop participants demonstrated the proper use & installation of a silt fence during the St. Croix ESC training workshop. We used rebar in place of wood stakes to anchor the fence. Trainees dug the trench for the material, placed the fence, staked it with ½" rebar, and then backfilled the trench. During a site visit two months later, about 4" to 6" of soil was found behind the silt fence and very little soil was on the roadway below the fence.



Workshop participants pose with their silt fence demonstration on St. Croix.

At the St. Thomas CES office, the public can see a properly installed silt fence with signs that show how to set up a silt fence that works. The fence is preventing soil runoff from flowing off the slope onto the driveway, a common problem in the V.I.

Triangular Dikes

Triangular dikes, another sediment control practice, can be used as a barrier to reduce sediment runoff from flat or gradual slopes or as a check dam in a fairly level swale. Trainees at



Installation of triangular dike check dam, Estate St. George's Hill, St. Croix.

the St. Croix ESC workshop installed a triangular dike as a check dam in a swale for a drainage culvert. They cleared the area for the dike, anchored it with metal staples, and backfilled soil and rock on top of the dike flaps to hold it in place. After two months the dike was still working properly, with about one inch of soil built up behind it.

Porous Paving

Two alternative paving practices using web cellular confinement material (GeoWeb®) and interlocking plastic blocks (GeoBlock®) are on display at the St. Thomas CES parking lot and driveway. These porous materials are more environmentally friendly foundations for low-use roads and parking areas. CES set up this demonstration to:

1. Control erosion and flooding problems;
2. Demonstrate the use of porous paving systems to reduce

stormwater runoff and erosion; and

3. Evaluate their durability under V.I. conditions.

To prepare for the porous paving, a backhoe excavated and graded the parking lot and driveway and the lot was rolled with a vibrating roller to smooth it.

GeoWeb® was installed in the driveway during a hands-on workshop. After participants saw a video describing the use of the webbing, they helped install it by stretching sections over the driveway and



Workshop attendees learn how to install GeoWeb®.

anchoring it with j-bars. A backhoe then filled the webbing with crushed stone and soil, and a vibrating roller compacted and smoothed the surface.



GeoBlock® with gravel entrance, prior to being filled with soil.

CES staff installed cellular blocks in the parking lot the following week. A backhoe filled the blocks with topsoil and staff raked the soil level and removed stones. Then we seeded the lot with a mix of bermuda, rye and bahia grasses.

Straw erosion control mats

laid on top of the lot held in moisture and kept birds from eating the grass seed.

The lot was watered to promote faster grass sprouting and growth. No parking was allowed on the lot for 3 months so that the grass could spread and toughen. Heavy use has damaged some of the grass, but the grass in the parking areas along the side is holding up well.

CES will continue to maintain and install erosion and sediment control practices to promote pollution prevention in the territory. For more information on erosion and sediment control, contact the UVI Cooperative Extension Service at (340) 692-4080 (St. Croix) or (340) 693-1080 (St. Thomas) or visit our website at: <http://www.uvi.edu/extension/ANRWQ/demoproj.htm>



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