Innovative Green Technology for Eroded Stream Bank Restoration

Lanka Santha, P.E.

RoLanka™ International, Inc.

The True Green Solution

155 Andrew Drive, Stockbridge, GA 30281, USA

www.rolanka.com

1-800-760-3215 (USA only) | 770-506-8211

Climate Change

- We are experiencing rapid changes in weather patterns.
- Heavy rain storms with tornadoes are very frequent.
- Create more threats to our ecosystem.

The increased impervious surfaces such as paved roads and parking lots concentrate the runoff flow and intensify water flow rates to rivers, lakes and reservoirs. This is creating threats to streambanks and shorelines.

As a result eroded streambanks similar to this are very common.

Soil Bioengineering

Soil bioengineering is an interdisciplinary approach to environmental restoration which protects water resources by combining biological systems with engineering principles to restore deteriorated soil masses.

These techniques make use of ability of mature vegetation to resist erosive forces. Strong, durable, natural and biodegradable coir products are used to provide initial soil protection as well as support for young vegetation until mature vegetation becomes established.

Advantages of bioengineered streambank restoration

- Aesthetically pleasing applications
- Provide wildlife and fish habitats
- Nourish naturally strong, healthy environment
- Support recreational activities
- Create environment to reduce human stress
- Convey peace of mind for all of us

In Soil Bioengineered Streambanks

Phase I - Structural stability (support) and protection against erosion are provided by artificial means.

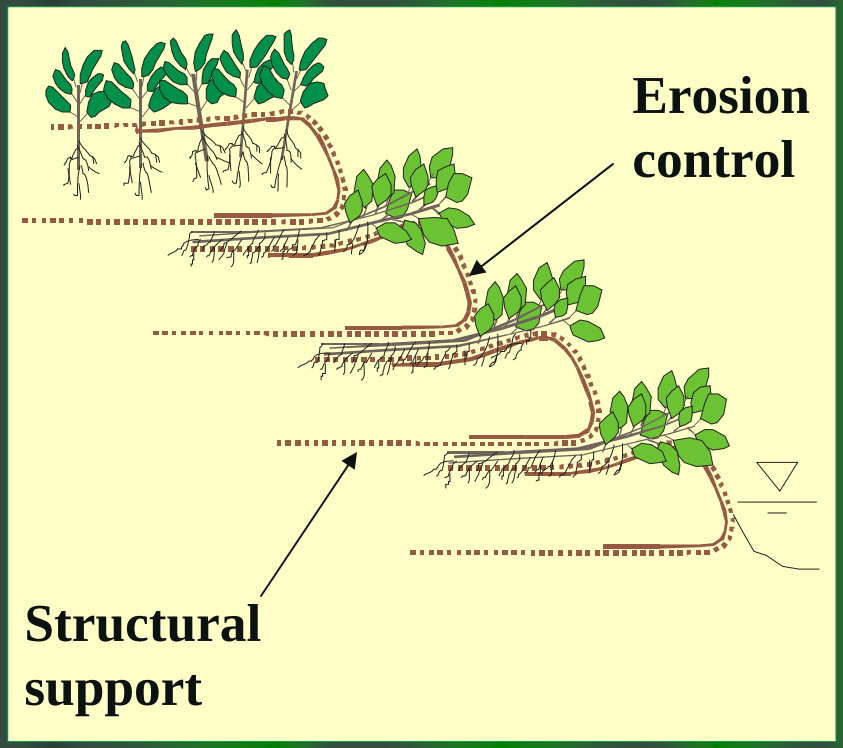
Phase II - Fully or partial structural stability (support) and protection against erosion come from natural vegetation.

Vegetated soil lift is the most popular bioengineered method for streambank restoration

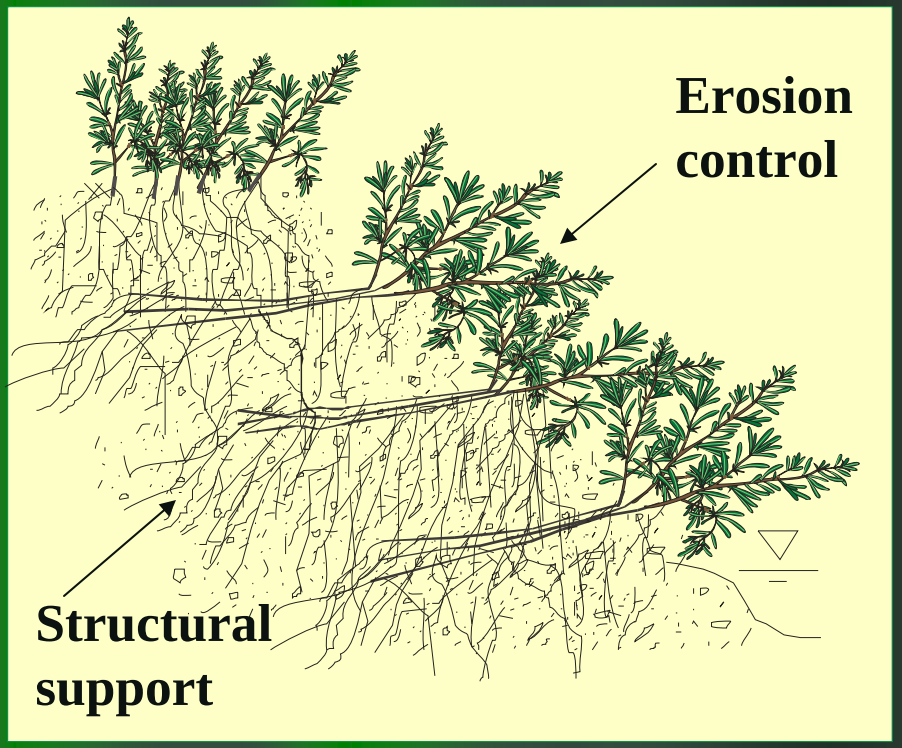
In the past, most soil lifts were done by using fabrics wrap soil layers.

Fabric wrapped soil lifts

Phase I



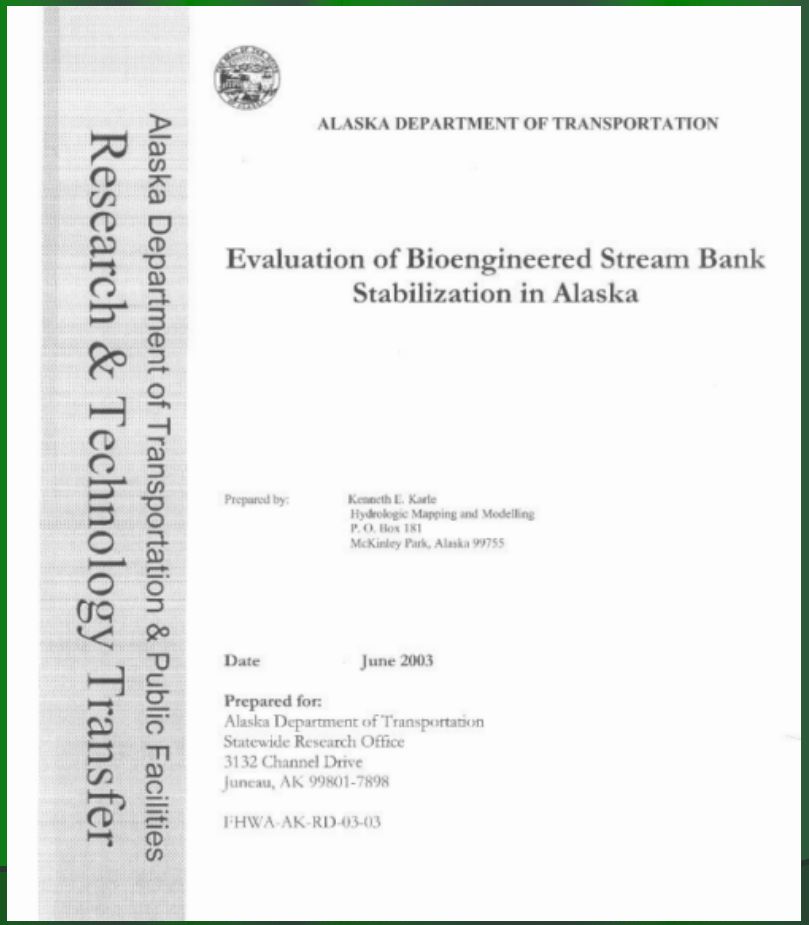
Phase II



Due to low thickness of fabrics, they may not last till vegetation reaches its maturity. In addition, shear stress and abrasion resistance of the constructed soil lift are not that high.

Alaska DOT Study discusses the problems with soil lift construction with fabrics

FHWA-AK-RD-03-03



Findings of AK DOT Study on Coir Fabric Wrapped Soil Lifts

Inner fabric had deteriorated, and soil particles had been transported out of the soil lift resulted in failure.

Findings of AK DOT Study on Synthetic Fabric Wrapped Soil Lifts

Inner fabric used inside the geogrid had deteriorated, and soil particles had been transported out of the soil lift resulted in failure.

Concerns of Fabric Wrapped Soil Lifts in Streambanks

- Inner fabric is too thin and degradation is too quick.
- Not enough abrasion resistance at the face of soil lifts.
- Not enough shear stress resistance.

Objectives

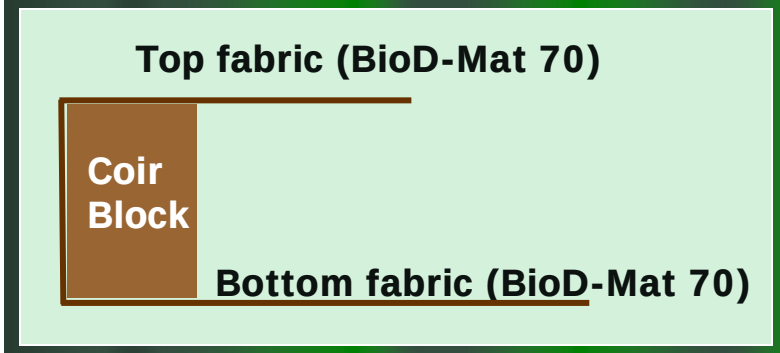
1. Introduce the patented fabric attached BioD-Block™ coir block system for soil lift construction.
2. Discuss advantages of the BioD-Block™ coir block system over soil lift construction with fabrics only.
3. Share various field applications of the coir block system.

BioD-Block™

Fabric attached coir block system

US patent #: 6893193

A versatile tool for easy construction of vegetated soil lifts.



Cross section of BioD-Block

Available Sizes

All blocks come in 10 ft sections

1. BioD-Block™ 12-300

Height: 12 in
Top fabric: 47 in, Bottom fabric: 47 in
Coir block thickness: 5 in

2. BioD-Block™ 16-300

Height: 16 in
Top fabric: 28 in, Bottom fabric: 56 in
Coir block thickness: 9 in

3. BioD-Block™ 16-400

Height: 16 in
Top fabric: 48 in, Bottom fabric: 75 in
Coir block thickness: 9 in

Advantages of BioD-Block™ System

1. Thick coir fiber block provide stronger abrasion resistance at the face of the lift.
2. Thick coir fiber block prevents exposing the soil in the soil lift for 5-7 years, thus allowing vegetation to grow on soil mass while preventing chances for failure.
3. Combination of coir fiber block & high strength coir fabric provides significantly higher shear stress resistance for extended time than soil lifts made of coir fabrics only.

4. Unique connection provides strong, continuous sections.

Provide stronger connections.

Two Connected BioD-Blocks front view

When installed, connections are structurally stable.

Other Advantages of BioD-Block™ System

- Makes construction easier and quicker than of the fabric wrapped soil layers.
- Reduces installation costs.
- Aesthetically pleasing applications.
- Provides stability to constructed soil mass until root structure is completely developed.
- Easily maintains constant layer heights.

Field Applications

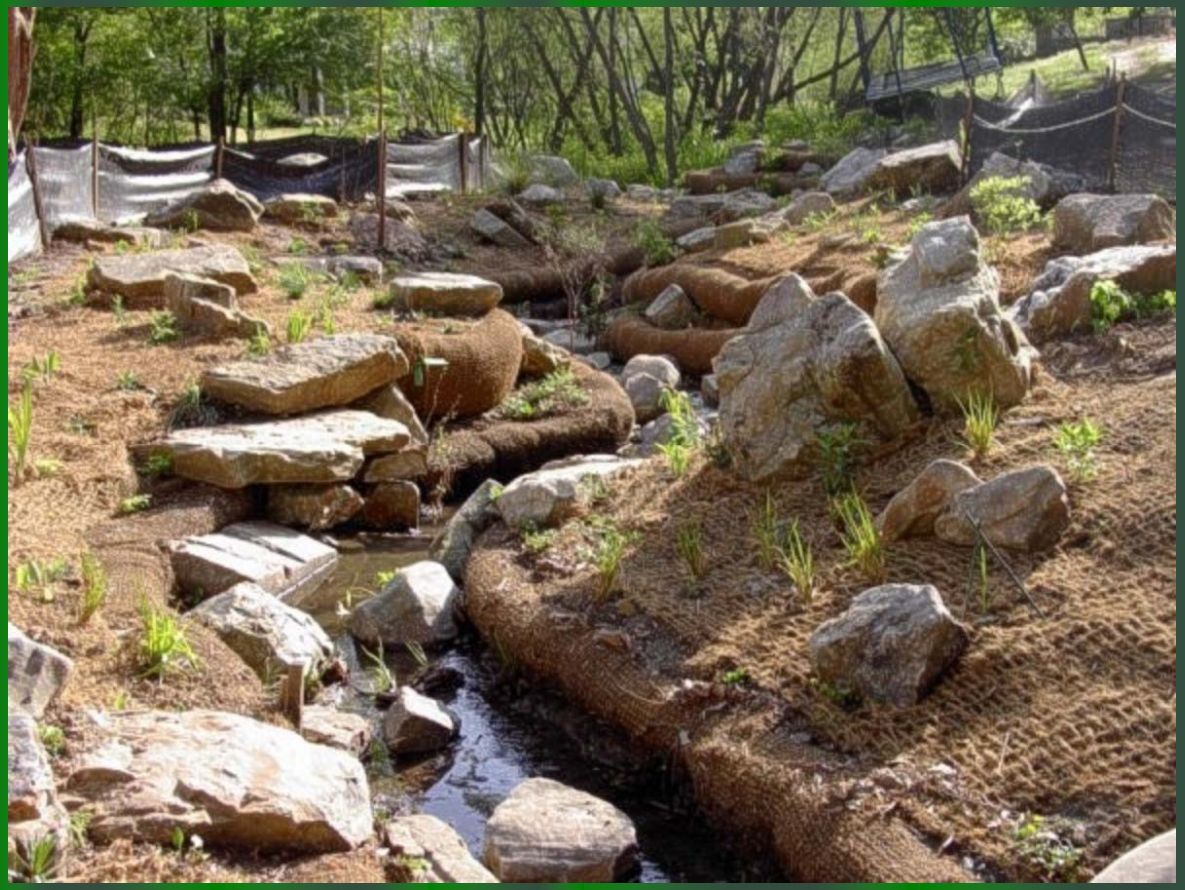
- BioD-Block system have been used in variety of applications.

- It is getting very popular among the engineers and designers who are looking for cost efficient, worry free, natural, wildlife friendly, and structurally strong ways for restoration.

Single-layer Stream Relocation

Designed by Massachusetts Municipal Wholesale Electric Company, MA

Single-layer Landscaping Application



Designed by Dekalb County, GA

Single-layer Shoreline Application

Designed by NM Parks and Recreation Dept.

Double-layer Slope Stabilization

Designed by VA DOT

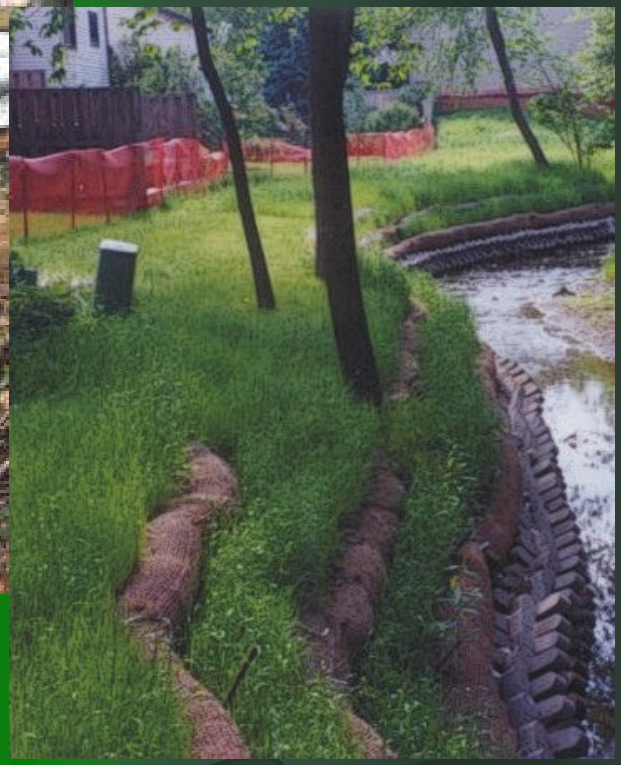
Multi-layer Riverbank Stabilization

Designed by EcoSouth, GA

Multilayer Streambank Restoration

Designed by CH2M Hill, Morrow, GA

Multilayer Streambank Restoration



Designed by Ted Gray & Associates, IL

Multilayer Riverbank Restoration

Designed by Tetra Tech, NM

Multilayer Slope Stabilization

Designed by MacKay & Sposito, Inc., WA

Multilayer Vertical Application

Designed by Questa Engineering Corporation, CA

8 months later

2 years later

Thank you!