Geosynthetic-Enhanced Erosion and Sediment Control Systems

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Abstract

Much of the development of geosynthetics technologies for environmental applications has been in response to government regulations. This is certainly true for geosynthetics used in erosion and sediment control. Geosynthetics continue to replace traditional materials such as soil and stone in performing important engineering functions in erosion and sediment control applications while simultaneously introducing greater versatility and cost-effectiveness. Geosynthetics are widely used as:

- a "carrier" for degradable materials for the enhancement of vegetative establishment;
- non-degradable materials to extend the erosion control limits of vegetation or soil;
- primary slope or channel linings;
- components in silt fences and turbidity curtains;
- containers or bags filled with soil to replace traditional marine protection blocks;
- and a component in an ever growing array of sediment retention devices.

Through their various manufactured forms, geosynthetics offer a wide variety of erosion control design solutions. Geosynthetics can be manufactured in the form of a mat, sheet, grid or web of either natural fiber, such as jute or coir, or artificial fiber, such as polyethylene, nylon or polypropylene. Several products are commercially available for use in erosion control, where they interact as a composite with the soil and vegetation. The general goal of erosion control geosynthetics is to protect the soil from erosion, either indefinitely or until vegetation can establish itself. Geosynthetics may serve as the complete erosion and sediment control product, or a part of a composite structure serving the designed product function. Geosynthetics can enhance applications of slope erosion, channel erosion, riverbank erosion and coastal erosion.

This keynote lecture reviews the many applications of geosynthetics in erosion and sediment control with emphasis on performance properties as measured via standardized test procedures, erosion design considerations and environmental benefits. Large-scale testing programs are described with some case histories highlighting the successful use of geosynthetics for erosion and sediment control.