NbS-54: VETIVER GRASS SYSTEMS (VGS)

Vetiver Grass Systems (VGS) addresses landslide prevention, slope stabilization, post-mining soil recovery, and soil enrichment near agricultural areas in Southeast Asia. Vetiver grass (*Chrysopogon zizanioides*), known for its deep, dense, and vertical root system, binds soil effectively, reducing erosion and improving slope stability, even on steep terrains and degraded landscapes. Its adaptability to diverse climatic conditions, from tropical to sub-tropical environments, makes it ideal for the region's diverse ecosystems. VGS is often combined with agroforestry practices, integrating native tree species such as teak (*Tectona grandis*), bamboo, and fruit-bearing trees to create multi-functional landscapes that provide additional ecological and economic benefits, such as wildlife habitat restoration, carbon sequestration, and livelihood support for local communities. By rehabilitating degraded lands, particularly in post-mining areas, VGS enhances soil fertility, water retention, and agricultural productivity, fostering climate resilience in flood- and drought-prone areas. Its affordability, minimal maintenance requirements, and compatibility with traditional farming systems make VGS socially and economically viable for smallholder farmers and local governments. Existing lessons from Southeast Asia emphasize the importance of participatory approaches in implementing VGS, where community engagement ensures sustained maintenance and integration with local land-use practices. As such, VGS supports not only physical resilience to climate events like floods and landslides but also strengthens rural livelihoods and promotes sustainable land management across the region.

LANDSCAPES SUPPORTED

EbA (ECOSYSTEM-BASED APPROACHES)

| EROSION CONTROL & SOIL CONSERVATION | AGROECOSYSTEM RESILIENCE | BIODIVERSITY ENHANCEMENT | FLOOD & WATER MANAGEMENT | SOIL FERTILITY & ENRICHMENT | CARBON SEQUESTRATION

MAIN PROBLEMS ADDRESSED

- SOIL EROSION
- FLOOD CONTROL
- DISASTER RISK REDUCTION

ECOSYSTEM SERVICES AND ACTIONS

SUPPORTING

- **Biodiversity enhancement**: VGS support species by providing ground cover and stabilizing soil.

REGULATING

- **Water filtration**: VGS dense root system reduces sediment and contaminants in water runoff, improving water quality in nearby water bodies.

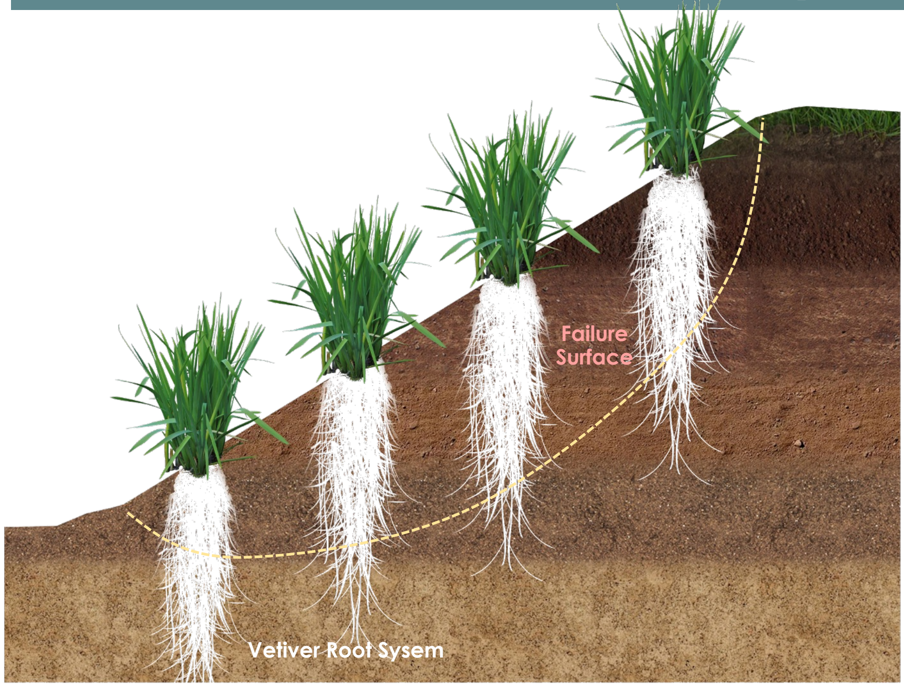
PROVISIONING

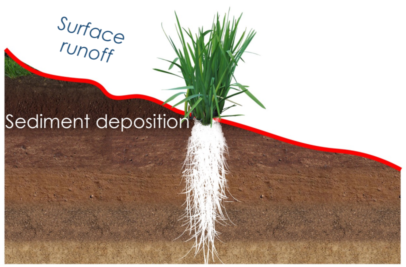
- **Soil fertility enhancement**: The root structure of vetiver enhances soil structure and helps retain moisture, improving soil quality and fertility.

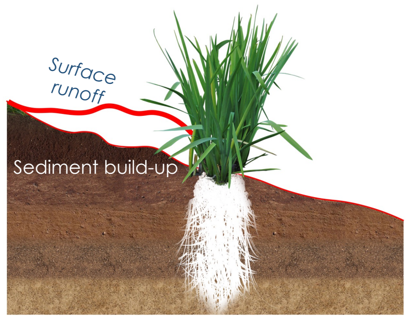
SOCIAL BENEFITS

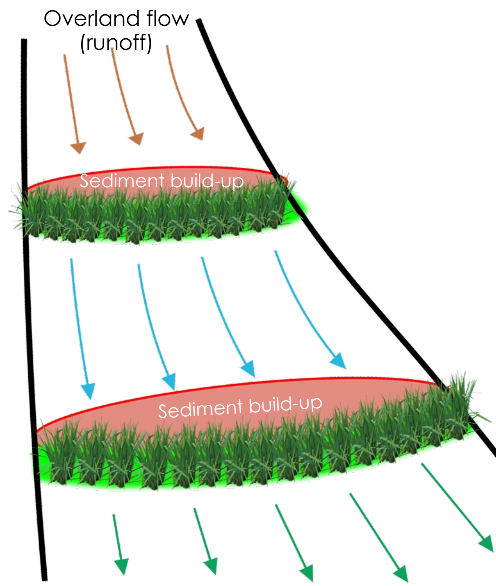
- **Livelihood support**: Vetiver grass can be harvested and processed into mats, baskets, and ropes, providing income for local communities.

NbS-54: VETIVER GRASS SYSTEMS (VGS)









PROJECT'S CHALLENGES & RISKS

- **Invasive Potential**: Vetiver grass, if not properly managed, may become invasive and outcompete local vegetation, leading to a loss of biodiversity in some ecosystems.
- **Site-Specific Suitability**: VGS may not be effective in areas with extreme soil salinity or poor drainage, limiting its application in certain coastal regions.
- **Initial Investment and Maintenance**: While VGS is cost-effective in the long term, initial establishment costs and ongoing maintenance efforts can be a barrier for smallholder farmers.
- **Climate Sensitivity**: Vetiver grass may not perform optimally in extreme climate conditions, such as prolonged droughts or high heat.

NbS co-BENEFITS AND THEIR INDICATORS

Soil Erosion Control
Reduced soil erosion rates, measured through sediment deposition and soil loss assessments.

Flood Mitigation
Decreased surface runoff, evaluated by water retention capacity and reduced flood frequency in adjacent areas.

Soil Fertility Restoration
Increased organic matter content and nutrient levels in the soil, measured by soil quality tests.

Carbon Sequestration
Amount of carbon stored in vetiver biomass and soil, quantified through carbon sequestration assessments.

Biodiversity Enhancement
Increased species diversity, tracked by monitoring the presence of native flora and fauna in areas integrated with VGS.

Livelihood Improvement
Increase in local income, measured by sales of vetiver-based products or improved agricultural yields.

COST ANALYSIS

Direct Costs
Vetiver grass system establishment costs (e.g., seedlings, planting, irrigation) range from $500 to $2,000 per ha.

Indirect Costs
Costs related to monitoring, maintenance, and capacity building for local communities can amount to $200 to $500 annually per ha.

Time Horizon
10–20 years time horizon with a discount rate of 5–10% to account for long-term benefits and costs.

Direct Benefits
Increased agricultural productivity or reduced erosion

Indirect Benefits
Indirect benefits, such as carbon sequestration, improved water quality, and biodiversity enhancement, can yield estimated savings or gains of $200 to $1,000 per hectare annually.

Risk Assessment
Risks include initial establishment failure, invasion by non-native species, or underperformance due to poor site selection

REFERENCES:

Mindanao Post-mining Rehabilitation Project, the Philippines
Post-Coal mining rehabilitation, Quang Ninh Province, Vietnam
VGS applications in Northern Highlands, Thailand

IMPLEMENTATION OPPORTUNITIES:

Riau Province post-mining recovery, Sumatra, Indonesia
Bolaven Plateau Soil recovery in agriculture, Laos
Slope stabilisation in Benguet Province, Phil.