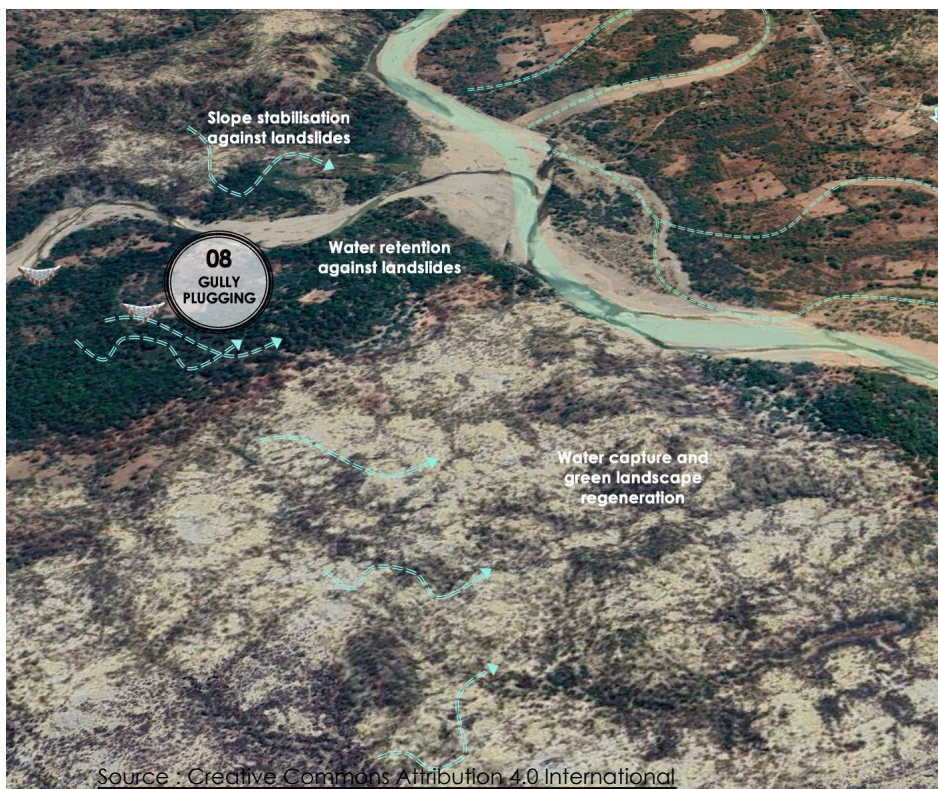


NbS-08: GULLY PLUGGING



Gully plugging is a low-cost, nature-based solution (NbS) designed to slow water flow, reduce erosion, and promote sediment deposition, particularly in hilly or mountainous regions.

It involves constructing small barriers across gullies using locally sourced materials like bamboo and stones, which are abundant and sustainable. Bamboo gully plugs are lightweight, biodegradable, and effective in trapping sediment and fostering vegetation growth, though they require periodic maintenance due to material degradation.

Stone gully plugs, on the other hand, are more durable, handle higher water flows, and provide a semi-permeable barrier that allows water infiltration while retaining soil upstream. Both approaches are often complemented by planting vegetation on slopes to further stabilize soil, enhance water retention, and increase long-term resilience.

Similar NbS, such as check dams and contour bunding, also address erosion control and water management, making them applicable in regions like Indonesia and the Philippines, where heavy rainfall and steep slopes exacerbate soil degradation.

Gully plugging supports regenerative agriculture by restoring degraded land, reducing sedimentation in downstream waterways, promoting groundwater recharge, and improving the sustainability of rural livelihoods.

LANDSCAPES SUPPORTED



EbA (ECOSYSTEM-BASED APPROACHES)

EROSION CONTROL & SOIL CONSERVATION

INTEGRATED WATERSHED MANAGEMENT

SUSTAINABLE WATER MANAGEMENT

AGROECOLOGICAL RESTORATION

MAIN PROBLEMS ADDRESSED



SOIL EROSION



DISASTER RISK REDUCTION



FLOOD CONTROL



FOOD SECURITY

ECOSYSTEM SERVICES AND ACTIONS

SUPPORTING

- Enhances soil formation and fertility by reducing erosion and promoting sediment deposition.

REGULATING

- Regulates water flow, reducing runoff velocity and increasing groundwater recharge.

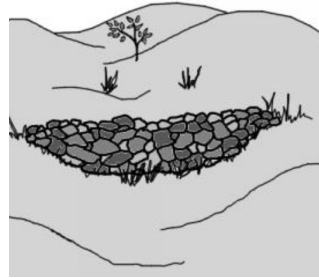
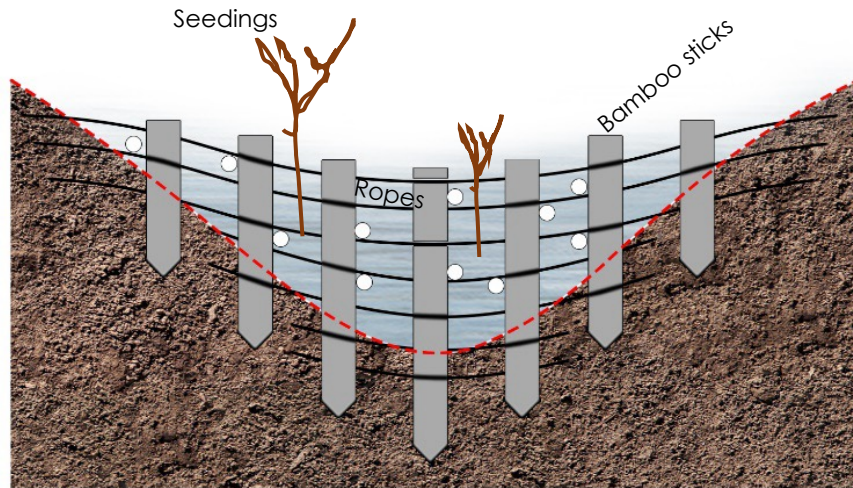
PROVISIONING

- Provides improved soil conditions for agriculture, increasing crop productivity in downstream areas.

SOCIAL BENEFITS

- Reduces the risk of floods and landslides, improving community resilience to climate extremes.

NbS-08: GULLY PLUGGING



PROJECT'S CHALLENGES & RISKS

- ❖ **Material degradation:** Bamboo gully plugs may degrade quickly in tropical climates, requiring frequent maintenance and replacement.
- ❖ **Extreme weather events:** Intense rainfall or flash floods can overtop or destroy gully plugs, reducing their effectiveness.
- ❖ **Sediment clogging:** Accumulated debris and sediment can block water flow, necessitating regular cleaning and monitoring.
- ❖ **Community engagement:** Lack of local awareness or involvement in construction and maintenance can lead to project neglect or failure.

NbS co-BENEFITS AND THEIR INDICATORS

- **Erosion control**
Reduction in annual soil loss by up to 50% in treated gullies.
- **Groundwater recharge**
Increased water table levels by 10–20% in adjacent areas.
- **Biodiversity enhancement**
Growth of native vegetation and habitat restoration along gullies within 1–2 years.
- **Flood mitigation**
Reduction in peak runoff flow during heavy rainfall events by 30–40%.
- **Agricultural productivity**
Improved crop yields by 15–25% in downstream areas due to better soil quality.
- **Community benefits**
Engagement of 50–100 households in gully plugging projects, creating jobs and raising environmental awareness.

COST ANALYSIS

- **Direct Costs**
Gully plugging construction costs range from \$2000 per structure, depending on materials like bamboo or stones.
- **Indirect Costs**
Maintenance, monitoring, and community training can add \$500–\$1,000 per year per site.
- **Time Horizon**
Benefits typically accrue over 10–20 years with a discount rate of 5–7% for cost-benefit analyses.
- **Direct Benefits**
Soil retention and improved land productivity.
- **Indirect Benefits**
Groundwater recharge and biodiversity enhancement contribute to long-term ecosystem services.
- **Risk Assessment**
Potential failure under extreme floods.

REFERENCES:

India, Maharashtra, Integrated Watershed Management Program.
Indonesia, Yogyakarta, Gunungkidul, Rainwater Harvesting and Gully Plugging Project.

IMPLEMENTATION OPPORTUNITIES:

Northern Thailand (Chiang Mai and Mae Hong Son Provinces).
Philippines, Central Luzon.
Southern Laos, Bolaven Plateau.