

ENGINEERING WITH NATURE: PORCUPINE STRUCTURES IN THE NEPALI CONTEXT

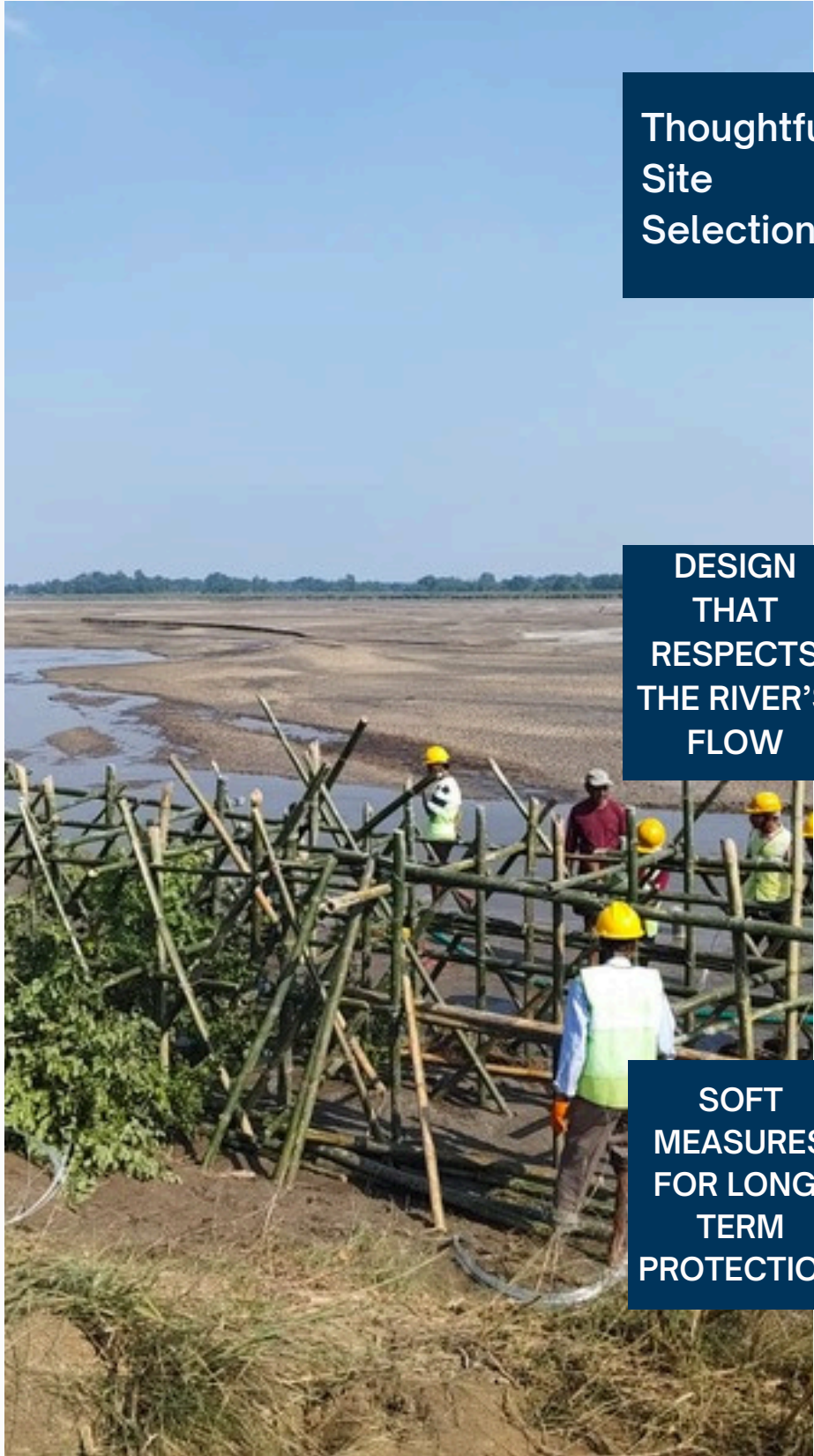




A Solution Rooted in the River's Nature

Most rivers in Nepal carry high sediment loads, especially in the Terai and foothills. During flood season, these sediments become both a challenge and an opportunity. Porcupine structures turn this challenge into an advantage: by reducing flow velocity along vulnerable banks, they encourage natural silt deposition, gradually rebuilding the eroded edges. Nepal's wide and wandering channels—Sunsari, Jhapa, Saptari, Bardiya, Kanchanpur—are ideal arenas for porcupine fields. Their permeable form diffuses energy while allowing the river to maintain its natural rhythm.

■ CRITICAL CONSIDERATIONS FOR IMPLEMENTATION



Thoughtful Site Selection

Success begins with understanding the river. Ideal stretches are those with moderate velocity, adequate sediment availability, and space for staggered or clustered arrangement.

DESIGN THAT RESPECTS THE RIVER'S FLOW

Well-laid porcupine fields work like a team. Their **spacing, angle, and density** must be planned so that **flow energy dissipates gradually**. When placed strategically, they **reduce erosion** without creating sudden changes in the river's behavior.

SOFT MEASURES FOR LONG-TERM PROTECTION

Strengthen outcomes by combining porcupines with:

- bamboo crib walls,
- vetiver or Napier grass plantation,
- brush layering and bio-engineering,
- toe-protection with sandbags or gabions.

A Technology the Community Can Own



Porcupines can be made from bamboo, timber, sandbags, or RCC poles—materials widely available in local markets. Their modular design allows communities, local governments, and disaster committees to construct and install them with Simple machinery. This promotes ownership, reduces cost, and enables quick deployment before in hand to emergency periods.

Key Learnings

1. Enhanced Technical Capacity:

Participants gained hands-on skills in designing and constructing low-cost, community-friendly flood-resilient structures such as porcupines, bamboo revetments. Exposure to real-time field demonstrations strengthened their understanding of **River Morphology and suitability of Porcupines, flow diversion techniques, and erosion control.**



69+
**TRAINED
PARTICIPANTS**

40%+
**FEMALE-YOUTH
PARTICIPANTS**

12+
**PALIKA POLICE
TRAINED**

“This training has strengthened our community’s capacity to protect lives and infrastructure from recurring floods. The hands-on demonstration of flood-resilient structures—especially the porcupine installation and bamboo-based solutions—has given our local teams the confidence to apply these techniques in real situations. We appreciate the collaboration with partners for bringing such practical and impactful knowledge to Barahakshetra. Moving forward, the municipality is committed to scaling these techniques across other vulnerable river stretches and integrating them into our disaster preparedness plans.”

Ramesh Karki

Mayor-Barahakshetra Municipality



Stronger Multi-Stakeholder Coordination

The training highlighted the importance of synchronized action among Palika officials, CDMCs, security forces, and community groups. Joint participation improved clarity of roles during flood emergencies and reinforced the operational value of coordinated early warning, construction, and monitoring efforts.



Community Ownership and Local Innovations

Local communities expressed **confidence in adopting and scaling context-specific, low-cost measures**. Their active involvement in structure installation demonstrated high ownership and a readiness to continue maintenance and monitoring of installed structures.



Practical Understanding of Site Selection

Participants understood the need for scientific site assessment—including understanding river dynamics, historical erosion lines, flow velocity, and vulnerable households—to ensure flood-resilient structures are placed where they generate maximum impact.



Way Forward

REPLICATION IN OTHER HIGH-RISK SITES

Scale up the demonstrated structures across additional erosion-prone segments in Sunsari, Jhapa, and neighbouring Palikas. Site selection should be based on updated hazard maps, PDRA findings, and community requests.

INTEGRATION INTO PALIKA DRR PLANS

Formalize the use of porcupines, bamboo-based measures, and sandbagging into annual DRR and preparedness plans. This will align local practices with FbAA activation protocols and ensure sustainable budgeting.

ESTABLISHMENT OF A COMMUNITY RESPONSE UNIT

Form trained local groups capable of rapid deployment during rising river levels. These groups should be equipped with basic tools, PPE, and materials to install temporary structures and support evacuation.

RESOURCE MOBILIZATION AND MATCHING FUND APPROACH

Promote co-financing between Palikas, Wards, and communities to ensure availability of materials and labour during emergency installations. This approach strengthens sustainability and encourages shared responsibility.



OVERALL CONCLUSION

The Flood Resilient Structure Training conducted in Sunsari and Jhapa successfully enhanced the technical capacity, coordination, and preparedness of local governments, CDMCs, and community members. Through practical demonstrations and field-based learning, participants gained the skills needed to design and install low-cost, context-appropriate flood mitigation structures such as porcupines, bamboo reinforcements, and sandbag walls. The active engagement of Palika representatives and communities reflected strong ownership and a shared commitment to reducing flood risks.