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Cover photo :

A roped team of climbers negotiates the final, exposed summit ridge of Mera Peak (6,476 m) in Nepal. This vantage point captures the essence of high-altitude commitment, set against a backdrop dominated by the colossal north face of Chamlang (7,319 m), which rises majestically from across the Hunku Valley. The image highlights the distinction between the immediate challenge of the ascent ridge and the immense scale of the greater Himalayan landscape, embodying the spirit of exploration at the frontiers of human endeavor.

Photo @Regan Kharel

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Acknowledgement

It is our immense pleasure to announce the 12th edition of VOICE OF HIMILAYA (VOH), which marks yet another significant turning point in our academic history of students research, scholarly research and investigation, and contributions to adventurous mountain studies, mountain science, and mountaineering.

A wide range of research papers, technical assessments, and perceptive comments from our professors and students are featured in the edition, reflecting their varied interests and expending areas of competence. The range of subjects covered in this volume is quite impressive, ranging from geological feature and earthquake of central Nepal to forest fire threats in mountain ecosystems of Karnali along with academic outputs of fiscal year 2081/82.

First and foremost, we would like to express our sincere gratitude to each and every author who contributed. Your commitment to data analysis, fieldwork, and academic writing has produced numerous publications that greatly expand our knowledge or mountain science, culture, mountaineering and adventure tourism. We owe a debt of gratitude to our editors and reviewers, whose careful attention to details and helpful criticism have helped us to refine each article. Your knowledge has been essential to upholding VOH's renowedly excellent academic standards.

We also thank NMA's board of directors and its many programs, and department, such as the Department of Academic and Research Development, which have made some of the research described here possible. The caliber of work our students produce demonstrates the Academy's dedication to promoting both academic brilliance and real-world mountain tourist abilities. We would like to thank our readers both inside and outside of the academic community for their ongoing interest in and participation in VOH. Your encouragement inspires us to consistently improve student research and academic publishing standards.

We are dedicated to giving up-and-coming mountain researchers and practitioners a stage in future. This 12th edition of VOH aims to inform, educate, and stimulate more research and innovation in this important field of study.

We appreciate your contributions to the success of this VOICE OF HIMALAYA

Anil Kiratee
Editor-In-Chief
Executive Director

Contents

Linking Science Communication with Communities about Nature-Based Solutions: A Case Study of Floating Treatment Wetland Systems (FTWS)

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Abstract

Nature-based solutions (NbS), such as Floating Treatment Wetland Systems (FTWS), offer cost-effective, ecologically sustainable methods for improving water quality in lakes. This study implemented an FTWS in Nagdaha Lake, Lalitpur, Nepal, and evaluated community-level science communication through a structured survey. Following stakeholder consultations, community engagement, World Wetland Day events, and awareness programs, a survey was conducted with 104 households (20% of 521) within a 350 m radius of the lake. Results showed that 88% of respondents recognized the FTWS installations but demonstrated limited understanding of their function, while 12% were unaware of the intervention. Participation in outreach activities significantly improved public comprehension of FTWS and their scientific basis. The findings emphasize the need for effective science communication to foster local ownership, awareness, and support for NbS initiatives.

Keywords: Community Engagement, Floating Treatment Wetlands, Nature-Based Solutions, Science Communication

Introduction

Wetlands hold cultural, religious, ecological, and aesthetic value, serving as critical habitats and supporting local economies through fisheries and recreation (Shrestha, 2011). In urban settings, surface water bodies fulfill essential community needs, including residential, recreational, and cultural services, while maintaining biodiversity.

However, South Asian nations like Nepal face increasing water pollution due to rapid urbanization and industrialization (Khadka et al., 2015; Sarker et al., 2021). While water was once primarily used for domestic and municipal needs, it is now heavily exploited for agriculture and industry, resulting in severe degradation of both surface and groundwater quality. The declining condition of urban water bodies is a growing environmental concern globally. Conventional water treatment methods are often prohibitively expensive (Harada & Karn, 2001; Arivukkarasu & Sathyanathan, 2024).

Engineering-based solutions, such as mechanical aeration and sediment dredging,

while effective, are costly and often ecologically disruptive. Chemical treatments like flocculation or oxidation provide short-term solutions but generate harmful by-products (Ge et al., 2019). In contrast, nature-based solutions (NbS) offer sustainable, low-cost alternatives. One such approach, Floating Treatment Wetland Systems (FTWS), involves using floating rafts planted with vegetation whose roots filter contaminants from the water (Arivukkarasu & Sathyanathan, 2024).

Community participation is key to the long-term success of NbS technologies (Shrestha, 2011). FTWS can be constructed using local materials and scaled for broader application, but successful adoption depends on scientific literacy within the community. In Nepal, while scientific knowledge is abundant, public engagement remains limited (Canfield et al., 2020). Bridging this gap requires effective science communication, which involves both disseminating information and engaging local stakeholders. Science communication promotes informed decision-making and helps communities contribute to environmental management efforts (Fischhoff, 2013).

Nepal's wetland conservation success stories—including Beesh Hazari, Ghodaghodi, and Lumbini—demonstrate the importance of community collaboration (Shrestha, 2011). Nonetheless, structured science communication practices remain underdeveloped. This study explores the relationship between science communication and community understanding in the context of an FTWS installation in Lalitpur, Nepal, contributing to best practices for community-driven wetland restoration.

Materials and Methods

Study Area

Nagdaha Lake is a culturally significant and shallow water body located in Ward 24 of Dhapakhel, Lalitpur Metropolitan City, Nepal (Figure 1). Surrounded by agricultural and residential zones, the lake spans approximately 25,253 m² and serves as a vital resource for local livelihoods and biodiversity. It receives water from a nearby spring, but is also impacted by urban runoff, sewage, and agricultural pollution.

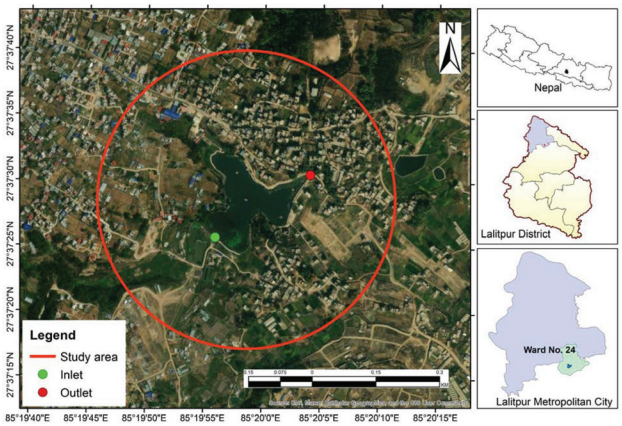


Figure 1
Study area for the community survey around Nagdaha Lake.

Note:
The red circle shows the 350 m sampling radius; green and red dots indicate the lake's inlet and outlet, respectively.

Methodology

Community Engagement

Prior to the survey, community engagement was prioritized. Activities included meetings with stakeholders, FTWS raft construction with local participation, and awareness events such as World Wetland Day 2023 (SEN, 2023). These initiatives aimed to build trust, increase familiarity with FTWS, and facilitate ongoing interaction with the technology.

Survey Design

A structured questionnaire was used to evaluate community knowledge, awareness, and perceptions regarding FTWS and water pollution. It combined open- and closed-ended questions to identify knowledge gaps and communicate the science behind FTWS. The survey design followed Canfield et al.'s (2020) four principles for science communication:

- Identify relevant scientific knowledge
- Assess existing community understanding
- Address critical knowledge gaps
- Evaluate communication effectiveness

Sampling Strategy

A 350-meter radius was drawn around Nagdaha, including 521 households. Using Google's random number generator, 20% (n = 104) of households were selected. The radius was chosen based on initial assessments of the lake's influence on the surrounding population.

Data Collection

Trained enumerators conducted in-person interviews, offering additional explanations and visual aids where necessary to ensure respondent comprehension.

Results

Community Awareness and Perception

Before the project, local awareness of NbS and FTWS was minimal. Community engagement efforts gradually improved recognition, but one year post-installation, only 5% of respondents understood the FTWS's purpose as a water remediation tool. While 88% had seen or heard of the rafts, many mistook them for decorative features, nurseries, or fishing equipment. The remaining 12% were unaware of the project entirely, often due to infrequent visits to the lake.

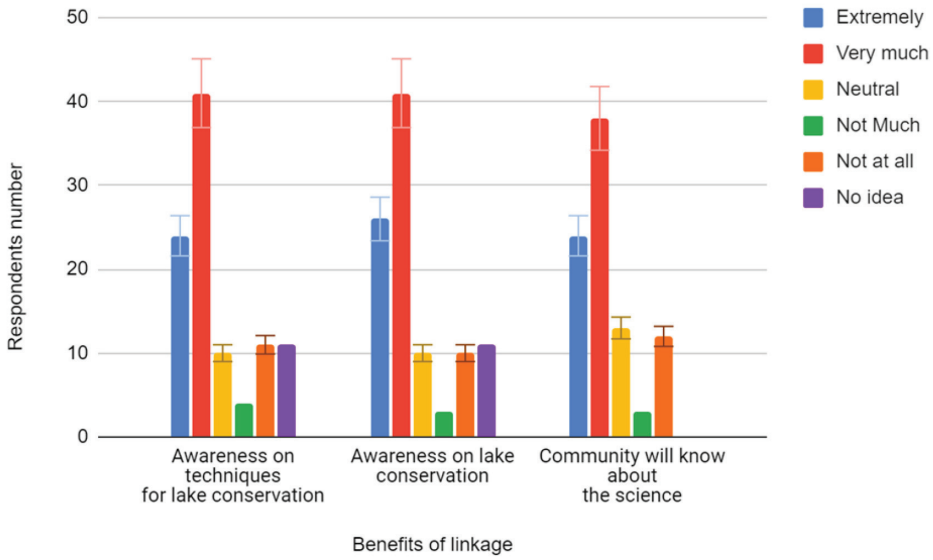
Figure 2

Volunteers engaging with community members during awareness activities.

This gap between visibility and understanding emphasized the need for improved science communication. After the purpose of FTWS was explained, 74% of respondents viewed science-community linkage positively, acknowledging its role in fostering conservation awareness (Figure 3).

Figure 3

Community responses regarding the perceived benefits of linking science with the public.



Workshops with local leaders, policy stakeholders, and the broader community followed the survey, enhancing curiosity and ownership. Community members began requesting training and involvement in maintaining the FTWS. The installation of informational signage and celebration of World Wetlands Day in 2023 and 2024 further supported outreach efforts (SEN, 2024).

The World Wetland Day 2024 celebration at Nagdaha brought together community members, students, local organizations, and stakeholders, reinforcing the importance of public engagement in wetland conservation. As part of the event, a project board detailing the FTWS initiative and key information about Nagdaha was installed near the lake to promote ongoing awareness and education. Figure 4 shows participants gathered for a group photo in front of the project board (left), and a closer view of the installed board at the site (right), serving as a visual and informational anchor for visitors and locals alike.

Figure 4

Participants pose for a group photo in front of the project board following the World Wetland Day 2024 celebration (left). The installed project board at Nagdaha providing information about the FTWS initiative (right).

Discussion

Although 88% of respondents were aware of the floating rafts, many failed to understand their ecological function. Aesthetic features such as flowers dominated public perception, overshadowing the science of pollutant remediation.

A key challenge was knowledge transfer from directly involved residents to the broader community. Factors such as limited social interaction, lack of confidence in communicating scientific ideas, and generational gaps hindered dissemination. Among older adults, comprehension remained a barrier despite explanation and outreach.

The survey itself acted as a science communication tool. Enumerators were trained to distribute pamphlets and explain FTWS principles during interviews. While 74% of respondents showed improved understanding post-survey, the remaining 26% struggled, revealing gaps that future projects should address with more diverse and inclusive communication methods.

Effective science communication goes beyond awareness—it fosters action. This project demonstrated how combining local knowledge with accessible scientific explanations can create lasting interest and lay the foundation for community-driven conservation.

Conclusion

This study highlights the crucial role of science communication in connecting

communities with nature-based solutions. Active community participation in FTWS installation, combined with structured outreach and interactive surveys, significantly improved public awareness and ownership.

Achieving community "resonance" with scientific projects is essential for sustainability and replication. However, linking scientific ideas with the complex realities of daily life—family, governance, education—remains a challenge. The need to scale NbS understanding in the face of climate change and environmental degradation is urgent.

Beyond empirical metrics, future initiatives must incorporate community narratives and lived experiences into the scientific process. Only through this integrated approach can ecological projects gain widespread support and drive meaningful change.

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