

# **Revival of Traditional Stone Spouts (Hiti) in Kathmandu Valley, Nepal: A Sustainable Solution for Community Resiliency through Indigenous Knowledge**

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## **Abstract.**

The traditional stone spouts (*hiti*) of the Kathmandu Valley, Nepal dating back to the sixth century continue to fulfill the water demands of the population, especially the urban poor. These intricately carved stone spouts are fed by natural underground aquifers and supported by groundwater supply components such as traditional canals, ponds, and wells, which are elaborate and intricate in design and technology. Spout water is regarded as a clean drinking water source; however, it is used mainly by low-income homes in the present day. These functional spouts fulfilled their primary supply of drinking water and had a total discharge of 2.4 MLD. Kathmandu Valley Water Supply Development Board (KVWSMB) identified 573 spouts in the valley, out of which only 224 were functional at the time of the survey and 94 were completely lost. these stone spouts system located in a plaza were also a source of community engagement and a place for performing religious rituals bonding a healthy society.

This case study documents the successful revival of the Alko Hiti, a traditional stone spout in one of the Newar communities of Kathmandu Valley. In 2000 AD, a bone mill factory's waste infiltrated the conduit of Alko hiti spreading an illness among the locals drinking the water that sparked a significant conservation movement. In 2003, active community participation played a vital role in reviving the Alko hiti complex. Thereafter, the activism not only developed the systematic use of hiti water but also revived the resiliency of the surrounding complex that contains the tangible and intangible heritage such as temples, idols, chaityas, *paati* (traditional resting place), pond, rajkulo (standard canal). This hiti now serves fresh water for more than 200 households. This exploratory research was conducted to understand the sub-surface structure of the indigenous stone spout system, tangible heritage, and its cultural practices to identify and analyze its contribution towards creating a healthy neighborhood. This case study can be a lesson for indigenous knowledge of a sustainable water supply system and its ripple effect towards preserving intangible heritage through their cultural practices for urban resilience.

**Keywords:** Indigenous Knowledge, Community Resilience, Urban Water structure, Urban Public Spaces, Tangible & Intangible Heritage.

## 1. Introduction

Stone spouts, commonly known as *Hiti* in the Newar community are traditional water supply systems consisting of monolithic carved stone that serves as a tap (Pradhan, 1990). The Hiti system is a utilitarian indigenous water system developed in the 15th century and is supported by *rajkulo*, ponds, and wells. These spouts use rain, surface, and groundwater to maintain a continuous flow. The Kathmandu Valley has around 400 recorded stone spouts (UN-Habitat, 2008). Shrestha (2009) suggests that the Licchavi kings connected these water supply systems to rain-fed ponds and springs built by the Kirat rulers, and the Malla kings expanded them further to meet the water needs of the valley.

The present condition of the hiti system is the result of different events over the years since the Malla regime was invaded by the Gorkhas (Joshi, 2022, p. 171). Later on, with population growth, uncontrolled urbanization, and increased water demand in the valley, the influence of the modern water tap system resulted in a disturbance in recharge areas that are responsible for drying water spouts. (Shrestha et al., 2022 ; Prajapati, R et al., 2012 ). The urban population in Nepal tripled in the past 10 years with the Kathmandu Valley alone exceeding 2.98 million inhabitants (IUCN, 2013; CBS, 2022). Consequently, ensuring water security has become a pressing issue as natural springs and traditional water sources, such as stone spouts, are depleting (ICIMOD, 2014). Climate change further exacerbates this challenge globally, including in Nepal, impacting water resources (Jha & Shrestha, 2013).

While dealing with urbanization and climate variability simultaneously, there has been the realization that indigenous knowledge can help in climate adaptation (Jan Petzold et al., 2020). Indigenous knowledge constitutes a complex interplay of interconnected traditions, beliefs, and knowledge systems, that intend for preserving, communicating, and contextualizing indigenous relationships with their cultural heritage and natural surroundings across temporal dimensions (Bruchac, 2014). Thus, it is imperative to appreciate the profound significance of indigenous knowledge as a guiding influence in shaping fundamental facets of daily existence among rural and indigenous communities. Indigenous knowledge, once disregarded in development and conservation, is now experiencing a revival, with its incorporation into projects recognized as essential.

Dhungana, G. et. al. (2023) argues that indigenous knowledge plays a crucial role in enhancing awareness of disaster risks, facilitating the implementation of effective local disaster management plans, and supporting scientific research and training endeavors. Ncube, B. urges reassessing the approach to indigenous knowledge systems necessitating acceleration of the development of the hybrid system and fostering authentic engagement with indigenous communities. (2022). Resilience, on the other hand, hinges on effective communication, enabling mutual understanding and the exchange of vital resources and community information between agencies. Without it, communities struggle to recover from disasters. (Nicholls, S., 2012).

The chapter is divided into five parts. The first part includes the introduction of the selected case study of Alko Hiti. Second is the methodology on how the case study was conducted followed by the result as the identification of culturally significant elements and activities around the studied area. The results were then interpreted in the discussion. At last, the revival of the stone spout interrelating with sustainable solutions and community resilience is concluded with remarks.

## 2. Case Study of Alko Hiti Complex

The knowledge of urban water structure is found in the Alko Hiti in Ikkhachen Community in Ward no. 11, Lalitpur Metropolitan City (LMC) whose history written in the inscription dates back to the 13th century, in 1415 AD during the Malla Period, and has been evolving since then. Alko hiti lies on the borderline of the core settlement and farmland. The hiti is surrounded by various religious and social components that invite the neighborhood to perform a social activity in the community. This hiti also has a unique groundwater system whose components needed to operate the hiti are present within the premises. Due to the development of piped water system and the negligence of such an ancient structure, hiti was in a non-operational condition for many years until 2003 AD when the locals came up with an innovative method to revive the traditional source of the hiti, to collect the surplus water from it and then distribute it among the locals in a systematic way. After the revival and renovation of the hiti complex, indigenous knowledge of the water system has been successfully implemented by the community. According to hiti experts and local community members, this was the second time hiti was renovated in over 542 years. At present, Alko Hiti is managed by Alko Hiti Conservation and Drinking Water User Committee (AHCDWYC).

The objective of the research is to identify the culturally integrated elements within the Alko hiti complex in the traditional settlement of the Ikkhachen Community. The identification of such elements will be associated with the socio-cultural practices performed by the community. This will be analyzed how the traditional urban water structure plays a role in enacting the traditional culture of the community.

### Method

Qualitative research was done to find the essence of community resiliency in the Alko hiti complex in Patan. Site measurement of the entire hiti complex was done to locate each identified component located on the site. The non-participation observation was done 3 times a day on July 17, 2021, at 9 am, 12 PM, and 5 PM to observe the activity around each identified element in the hiti complex. At the same time, participatory observation was done by interviewing 4 key people, 3 offline and two online. Among the key persons, 3 were local community members and experts in the Hiti system while the other was a researcher who was involved in the renovation project of the Hiti system in 2003. The research questions were related to identifying the elements that exist in the hiti complex, and their cultural significance and uses over time. The findings were then intersectionally discussed with indigenous knowledge and its relationship to community resiliency. The Covid-19 partial restrictions during the field observation were considered to be the limitation for variance in activity and knowledge sources.

### Results

The finding is the identification of the components and its activities in the hiti Complex while understanding the complexities of the hiti system and community participation process in the revival. Hiti identifies as a water element and is rooted in utilitarianism in the cultural aspects.

The Alko Hiti complex has 6 elements as shown in the figure 1. *Hiti*, 2. *Pati* (or, *Falcha* in Newari), 3. Pond, 4. Lawn (*Chaur*), 5. Alko Hiti Conservation Committee Building, 6. Storage. The construction materials used in hiti complexes reflect the earthy nature of the surroundings with the

local brick pavement enhancing the sense of place and increasing the importance of the spaces around them.

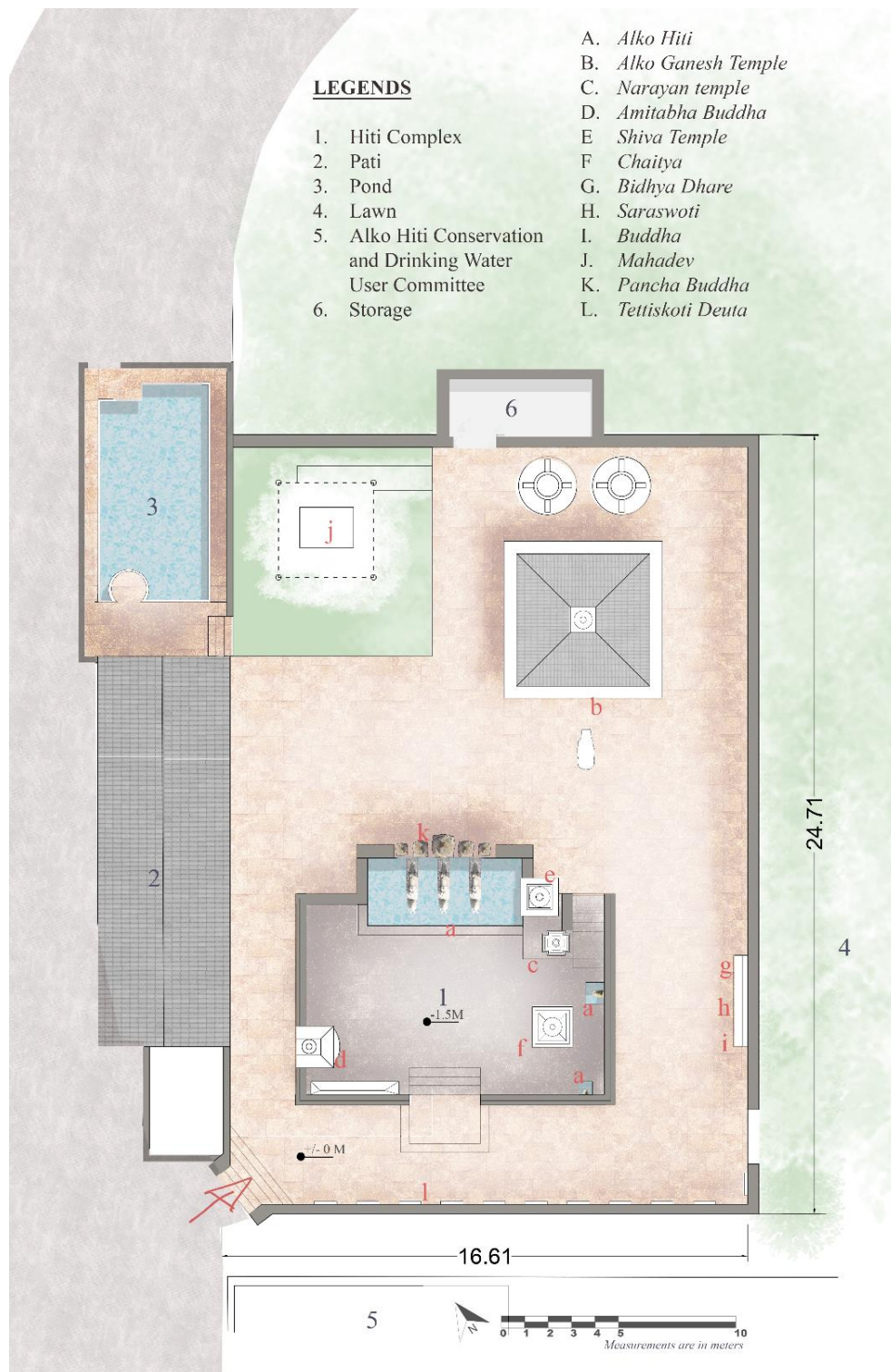


Figure 1: Site Plan of Alko Hiti Complex (Source: Author)

With 5 stone spouts (*hiti*) in the complex (3 big and 2 small), three stone water spouts, each with a 4.5ft depth and 6 inches wide intensively carved with *Makara* (mythological water monsters) snake, for unclogging the groundwater. It has the statue of *Bhagirathi* at the bottom of the hiti while secured by *Pancha Buddha* at the top.

Pati or *falcha* is a public rest house built about 542 years ago as written in the inscription similar to the time when *hiti* was built. It was built as a rest house for long-distance travelers as well as the local community for conducting *bhajans*. At present, it is used to hold community meetings. Pond or *Pokhari* lies on the northern side of the hiti complex and is built to maintain water management of the hiti complex. Surplus water from hiti drains out to a pond and passes to farming land. At the northern end, there is the presence of storage where sculpture making is also done and stored that are required for *jatras* and festivals.



Figure 2: Picture showing Alko Hiti streams  
(Source: Author)

A total of 12 different temples, shrines, idols, and deities were identified in the hiti complex out of which three of them is a temple. wall-mounted deities like Saraswati, buddha, *Bidhya dhare*, *tettis koti deuta* were also around the complex. Chaitya, modern statues of Buddha, and statues of *Pancha Buddha* were also present in the complex. Each of the elements is mapped in a site plan of *alko hiti* (Figure 1).

Alko Ganesh is one of the prominent temples of the complex as it is worshiped daily and importantly on Tuesdays remembering the lord Ganesh. It is believed to have a groundwater aquifer of hiti under the temple. (Joshi, 2022, p. 298). The temple is also famous for the occasion of presenting an authentic traditional Newari feast *samaybaji* in front of the temple during *Indra Jatra*. Narayan Temple is a shikhara-style temple worshiped daily in the morning and has its significance during the Narayanthan *mela* which is held in October/November. Amitabha Buddha is a recent addition to the temple complex made with modern materials like concrete, plaster, and paint. It is mainly worshiped by Buddhists, especially in Buddha Jayanti.



Figure 3: Statues of Bidhya dhare, Saraswati, Buddha (Source: Author)

Shiva Temple is a deity enclosed with the *Shiva linga*, and is worshiped daily by the Hindus. Chaitya, in the Buddhist religion, is believed to be built in the memory of a deceased family member for the accumulation of merit by the dead, by the member of surviving generation, and by all sentient creatures. The shrine contains carved inscriptions that address the sacred object directly and give information about the donor and the year of its creation. *Bidhya Dhare*



is one of the statues under the Hindu deity along with Saraswati and Buddha placed on the wall niches on the eastern side of the complex wall. Saraswati statue is worshiped during *Sri Panchami* while the Buddha statue is worshiped on the day of Buddha Jayanti. The statue of Mahadev which is a Hindu deity is in the northern corner of the complex separated by bushes. It has *Shiva linga* in the center of the structure and is worshiped daily by the community. *Pancha Buddha* placed linearly right above the main water spouts is the 5 carved structures with variance in size that represent five different qualities of Shakyamuni Buddha. *Tettiskoti Deuta*, statues of deities are located in front of the water spouts towards the right wall of the entrance is a total of 15 sculptures placed along niches. In the early morning, locals who come to the complex to get the sacred water from the hiti (*Chakra paani*), take a few rounds around the hiti complex and worship all these statues. Water spout which dries in the winter season however remains thriving due to the presence of these religious significance. Such a unique blend of Hindu and Buddhist cultures makes the public space even more diverse and inclusive. Community members occasionally visit the space for religious rituals, refreshment activities or just to gather up with the neighbors for meetings and *bhajans*.



Figure 4: Alko Hiti complex showing various culturally significant elements (Source: Author)

Among the cultural practices around the hiti complex, *Sithi Nakha* is a significant traditional practice celebrated by the Newar community to welcome the rainy season. It takes place on the sixth day of the bright fortnight of Jestha and is dedicated to the deity Kumar, the Shasthi. As part of the celebration, people clean water sources such as hiti, ponds, and wells to ensure an adequate water supply for the upcoming paddy plantation season. This festival is crucial in water source conservation and promoting sanitation practices. The timing of *Sithi Nakha* is scientifically considered appropriate as it coincides with lowered water levels and prevalent water scarcity. The festival also incorporates agricultural practices and pays homage to the deity of Kumar. A specific procedure is followed during the festival to clean the wells and water sources. Also, during the first day of the Hindu calendar *Baishakh* 1, *Khai-sanhu* named the *tantrik* ritual is practiced in the Alko hiti complex. Besides that, Nag-Panchami, a festival to celebrate cobras, that helps in unclogging the underground water system is also practiced in the complex.



Figure 5: Pond in Alko Hiti Complex (Source: Author)

## Discussion

In the era of digitalization where civic disengagement, narcissism, and individualism is creating disintegration in society (Twenge, J. M., 2013), it is evident that social connection is significantly interconnected with well-being, fostering the community and mental efficacy (Holt L J, 2022). This identification of the culturally integrated utilitarian system in the urban public space of the Newar community concludes our understanding of cultural and community management as integrating a public belief with culture, using open space as recreational and festive activities, and developing a sense of belonging toward the management of the space. (Joshi, 2022, p. 101). In the case of the Ikkhachen community, the findings reveal that these spouts and their surroundings have deep historical and religious roots as well as bear natural and cultural responsibilities. The revival of the Hiti complex not only serves the purpose of water distribution but also functions to enhance community engagement and preserve intangible heritage. It plays a vital role in hosting various festivals and serves as a place for religious functions, and ritual workshops.

The knowledge of cultural practices among the Newari community around hiti is well known to those associated with them as it is locally practiced and integrated within the lifestyle. The knowledge is transmitted by the practice of the household. The community starts their day by using the pure flowing water '*Chakra Pani*' from the nearby stone spout is the symbol the purity and physical well-being. The ancient trend of cleaning the water sources and considering it as a festival is a collective effort to maintain the traditional urban water infrastructure and remains a prime example of socio-cultural harmony for community resiliency. The festival of sithi nakha, which takes place just before the monsoon season, helps prevent water blockages and ensures a fresh water supply, demonstrating indigenous knowledge in disaster preparedness.

The Hiti renovated twice over the 542 years is an example of resilience by design. During the 2015 Gorkha Earthquake, the role played by the Hiti system in community resilience was exemplary. The earthquake disrupted the piped water system in Kathmandu Valley. (Shrestha, S., et al, 2017). However, the ancient technology of the stone spouts remained functional during the crisis and the community living near these spouts shared the burden of the piped water system to some extent, showcasing the realization of disaster resilience through indigenous knowledge. Not only that, the earthquake made the community members utilize this traditional urban public space as a temporary shelter with tent ignited value of such spaces during the disasters.

## 3. Conclusion

The socio-technical imaginaries (O. Molden & K. Meehan, 2017) that have developed over the centuries challenged conventional and uniform notions of modernization. Realizing the indigenous knowledge value of stone spouts, the community movements have garnered the interest and support of influential individuals and non-governmental organizations in providing political, financial, and technical assistance to local initiatives. Their focus lies in restoring ancient water infrastructure and preserving associated traditions. As a result of external attention, local stone spouts have gained increased awareness within communities. (O. Molden & K. Meehan, 2017). The renovation movement that was initiated after the bone mill incident in the Alko hiti, ignited a mass revolution among other neighborhoods which made other functional spouts like Nagbahal, Washa Hiti, and Kunti Hiti have in successful in re-transitioning from the water grid to the local source. These spouts may act as an identifier to maintain the historical infrastructures and the accompanying narratives to influence the social and technological visions of present and future

urban development in the Kathmandu Valley. These dynamics of a system of traditional water supply and cultural integrity compel us to critically re-think the current development model with the ancient developmental practices regarding sustainability, resilience, and socio-cultural identity. Understanding the value of traditional water supply systems and their influence on the community is essential for achieving sustainability and preserving these cultural and ecological values.

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