

Water for Asian Cities Programme Nepal



WATER MOVEMENT IN PATAN

WITH REFERENCE TO
TRADITIONAL STONE SPOUTS IN NEPAL



2008

Copyright © United Nations Human Settlements Programme (UN-HABITAT), 2008

All rights reserved. The material in this publication may be reproduced in whole or in part or in any form for education or non-profit uses without special permission from the copyright holder, provided acknowledgment of the source is made. UN-HABITAT would appreciate receiving a copy of any publication which uses this publication as a source.

Citation

UN-HABITAT, 2008. *Water Movements in Patan with Reference to Traditional Stone Spouts*. UN-HABITAT Water for Asian Cities Programme Nepal, Kathmandu.

**United Nations Human Settlements
Programme (UN-HABITAT)**

P.O. Box 30030, Nairobi 00100, Kenya

Tel (254-20) 7621234

Fax (254-20) 7624266

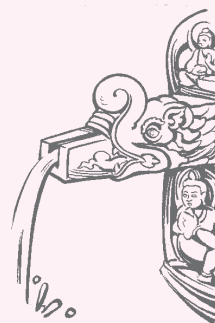
E-mail infohabitat@unhabitat.org

Web www.unhabitat.org

ISBN: 978-9937-2-0391-3

***Disclaimer:** The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations concerning the legal status of any country, territory, city or area, or of its authorities or concerning delimitation of its frontiers or boundaries or regarding its economic system or degree of development. The analysis, conclusions and recommendations of the report do not necessarily reflect the views of the United Nations Human Settlements Programme (UN-HABITAT), the Governing Council of UNHABITAT or its Member States.*

April, 2008



PREFACE

With support from the Water and Sanitation Trust fund, UN-HABITAT is implementing the Water for Asian Cities Programme (WAC) which is currently operational in India, People's Republic of China, Nepal, Lao PDR and Vietnam and is being extended to other Cambodia, Indonesia and Pakistan.

This book is the result of the interesting and important movement taking place in Patan, Lalitpur. The scarcity of water in Kathmandu Valley has pushed the population back to the traditional water conduits, the perennial sources which was built with the knowledge, skills and wisdom that started even before the Christian Era and took a complete shape more than fifteen centuries before in this valley. Later it was expanded and polished. However, this water civilization was realised very recently after the immense scarcity of water faced by the valley population.

Scarcity perhaps was the strict teacher and communities were the obedient students. Slowly and gradually, the communities initiated to discover the forgotten science and explored the buried technology, the technologies that their forefathers left as an asset to them. The challenge; however is to conserve these time-proven technologies that did demand simple but sustainable management, the management that kept the system intact for several centuries, even up to this generation. This book is the outcome of the knowledge and experiences gained while participating in the process of their endeavour to preserve the traditional wisdom while quenching their thirst.

The preparation of this book was planned and coordinated by Dr. Roshan Raj Shrestha, Chief Technical Adviser, WAC Nepal and prepared by Mr. Padma Sunder Joshi, Consultant and Associate Professor, Institute of Engineering who made this publication possible with his generous support and dedication. The WAC programme appreciates the contribution of Mr. Satya Mohan Joshi, Dr. Sudarshan Raj Tiwari, Professor, IOE (TU); Mr. Prayag Raj Joshi, Hiti Expert and Mr. Prakash Amatya, Executive Director, NGOFUWS in the preparation of this publication. The WAC programme is also indebted to all the informants including Mr. Sushil Shrestha and his team of Alkwo Hiti, Mr. Manoj Chipalu and his team of Sundhara, and all others whose names are listed in the annexure of this report for providing their valuable time and information and also thankful to Mr. Sunil Shakya, who was involved in the process as a researcher, untiringly helped in gathering the information and in logistics.

Andre Dzikus

Chief

Water and Sanitation Section II

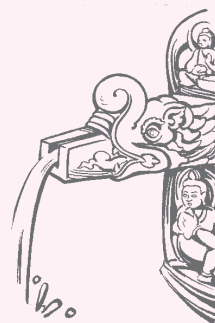
Water, Sanitation and Infrastructure Branch

United Nations Human Settlements Programme (UN-HABITAT)





Water Movement in Patan with reference to traditional stone spouts



CONTENTS

iii	Preface	
vii	Abbreviations & glossary	
1	Introduction	
	Background	1
	Patan: The example	3
5	The Historical Context	
	The traditional water system of Newars	5
	<i>Gaa hiti</i> : The stone spouts	6
	<i>Tun</i> : The dug wells	7
	<i>Pukhu (Pokhari)</i> or the ponds	8
	Historical background of water system in Patan	9
17	The Modern Mismatch	17
	The piped water in Patan	17
	The recent encroachments	19
25	Present Water Stress in Patan	
	The NWSC supply	25
	The alternatives	27
29	Movement for Water in Patan	
	The Alkwo Hiti case	29



The Sundhara Case	38
Other cases	43
The national movement of stone spout conservation	50

55 The Challenges

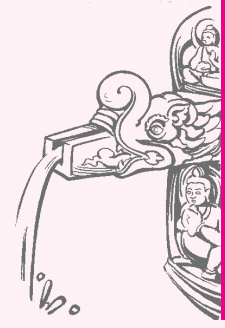
The technical challenges	55
The legal challenges	56
The social challenges	58
The management challenges	61
Roles and responsibilities of key stakeholders	64

65 CONCLUSIONS: THE PATH AHEAD 65

REFERENCES 67

Annexes

Annex A: Important events of Historical Stone spouts and Source Conservation Association (HSSCA)	69
Annex B: Declaration of National Convention on Stone Spouts	72
Annex C: Status of <i>Pukhus</i> in Patan	73
Annex D: List of persons contributed in the study	74



ABBREVIATIONS & GLOSSARY

CDO	Chief District Officer, the administrative head of district.
DDC	District Development Committee
HSSCA	Historical Stone Spouts and Source Conservation Committee
LSMC	Lalitpur Sub-metropolitan City
MLD	Million litres per day
NWSC	Nepal Water Supply Corporation
PIE	Patan Industrial Estate
VDC	Village Development Committee, the lowest level of local government

Local words

ā	is the phonetic symbol giving elongated 'a' sound like in 'saw'
athah	round laundry vessel normally made of burnt clay
dhon	rectangular drain pipe in Newari normally made of burnt clay.
gaa hiti	<i>hiti</i> at depression. Normally stone spouts are constructed at depression to meet adequate head for the flow.
gathucha	kind of clay which is very impervious
ghā	water pot made of brass, copper or burnt clay, used to fetch water normally carried by women resting on their waist.
guthi	it is a trust established to take care of festivals, <i>puja</i> or infrastructures.
hiti	water tap in Newari. In this book it is used for stone spouts.
hitigaa	the main depression of <i>hiti</i> where people go to collect water.
hitidun	also known as , the channel that brings water to the spout.
hitimangaa	the main spout made of stone with beautiful carvings.
jaroon	special water tank made of stone installed to serve pedestrians



<i>jatra</i>	the carnival participated by all the people.
<i>khas</i>	The nationality of Brahmin, Chhetries and others in Nepal, who migrated to Nepal from West and spread all over Nepal after conquer by King Prithvi Narayan Shah.
<i>khichamugā</i>	community toilet next to the settlement during old time. Kirat were the indigenous people of the valley who dominated the valley until early Christian Era.
<i>Lapsi</i>	Kind of sour fruit of large tree of one inch length elliptical shape.
<i>lohn hiti</i>	stone spout in Newari.
<i>Lichchhavi</i>	Successor of Kirat in Kathmandu valley who are believed to have migrated from India.
<i>malā</i>	community toilet next to the settlement during old time.
<i>Malla</i>	After Lichchhavi, Malla were the rulers in Kathmandu Valley. They survived until 1720s before <i>khas</i> rulers conquered the valley.
<i>naga</i>	serpent
<i>nayo</i>	leader in Newari
<i>nilah</i>	pure or sacred water used for <i>puja</i> .
<i>panju</i>	the priests offering <i>puja</i> to Matsydranath.
<i>Podes</i>	The so called untouchable caste responsible for sweeping streets and public places.
<i>pukhu</i>	pond, normally used to collect water and recharge the ground
<i>puja</i>	the performance of offering to god.
<i>mangaa</i>	is the chamber (or manhole) where water is collected and bifurcated among the <i>hities</i> or <i>hiti mangaa</i> .
<i>deidhā</i>	The main channel bringing water from surface sources to irrigate or recharge <i>Pukhus</i> .
<i>rajkulo</i>	The main channel bringing water from surface sources to irrigate or recharge <i>Pukhus</i> in Nepali.
<i>ratha</i>	the vehicle used for carrying idol of god. Chariot.
<i>ropani</i>	unit of land used in Nepal which is equal to 5476 sq ft.
<i>tantric</i>	One of the Buddhist/Hindu school of thought
<i>tar</i>	elevated and normally rainfed land
<i>tole</i>	neighbourhood
<i>tun</i>	dug well
<i>vaidya</i>	doctor practicing oriental medicine



INTRODUCTION

Background

Lalitpur Sub-metropolitan City is the second largest city in Kathmandu Valley encompassing 15.43 square kilometre area. The main town popularly known as *Yala* in Newari and *Patan* in Nepali; is the main township on the North of the municipal area that dated back more than two centuries (Tiwari, S. R. 2001). Encompassed in the so called greater Kathmandu, Lalitpur is facing sever water scarcity. Apart from exploring the possibilities of augmenting the municipal supply from alternate sources, the shortage has dragged them to re-think, conserve and revive traditional water supply systems. More interesting in this venture; the government, local or the national; is taking back seat while people have come up and showed their eagerness in managing the water resource through concerns, advocacy, and organisation.



Nepal the original name of Kathmandu Valley (later extended for the name of the country), was one of the famous urban centres of Asia in the historic time. Emerged as the main gateway of Indo-Tibet trade, this valley observed major settlements before Christian Era. This could be possible with knowledge, skill and management capabilities of then societies. In the ecological settings, *Kirat*, the then rulers utilised *tar*¹ lands for their settlements, to leave fertile river flood plains for agriculture (Tiwari, S. R. 2002) and to protect themselves from floods and disasters. The knowledge and skills were continued and enhanced in Lichchavi Period and further extended during Malla Period.

Thus, Newars, the inhabitants of this valley, were endowed with their superb skills of managing resources (including water resource) which resembles with natural limits both in intent and extents. The civilisation of 'Nepal' could flourish through three major cities; viz. Kathmandu, Patan and Bhaktapur (*Yen, Yala* and *Khwopa* respectively in Newari), and few dozens of smaller settlements all over the valley and extended even up to Dolkha in the east and Palpa in the west. These ancient cities survived and continued to our times. However, with conquering of the valley by Prithvi Narayan Shah and his successors, especially Ranas; could not understand these fascinating systems of life and city management. They betrayed with the traditional knowledge and wisdom in several aspects. After 1950, the post democracy period perhaps; is the worst period for the destruction of these indigenous practices where state (and thus the people) was of the idea that the western culture and education is unquestionably correct and indispensably superior to oriental knowledge and skills. The obvious result of this irony is the challenges faced by this generation to conserve their living culture and heritage in lively manner matching the modernised lifestyle. Reviving stone spouts is one of the outbreaks of these thoughts; thoughts that are fuelled by the wants and compulsions.

Primarily, there were two water sources used by the Newars: *hiti*, the water spouts at manmade depressions and *tun*, the dug wells. The sources of both these water conduits were shallow ground water. *Lohn hiti*, meaning stone spout and *gaa hiti*, meaning spout at depression are the two terminologies normally used by the Newars for the stone spouts. Besides natural charging of the *hities* through local aquifers, people at that time also mastered the skill of recharging the local aquifers by conveyance canals popularly known as *deidhā*² or *rajkulo* through ponds. Network of canals, ponds and the water conduits was established in such a way that the city could serve water both in quality and quantity to its urban population through-out a year.

Later, Rana rulers introduced piped water system in late 1800. After the country was open to the world in 1950, the western water management system was expanded to these cities and rest of the country. While introducing the latter, caution was not taken in conserving the time proven technology and management system. Now, with the limited resources and

1. *Tar* is the elevated land which has to rely completely on rainfall if cultivated.
2. *Dei* meaning *desh* or the country, or state and *dhā* meaning the drainage or irrigation canal. It is also known as *raj kulo*, the royal canal or the state canal.

weak management capabilities of the government, people are looking back to the old systems which have irrigated the civilisation of the time incessantly and successively. In the particular case of Patan, large population of the city are still using traditional water sources. In the absence of proper policies to maintain the system and uncontrolled exploitation of the natural aquifers, competitions are taking place to meet their requirements. These contradictions are challenging the status quo and searching new dimension for sustainable use of water resources.

Patan: The example

Traditional water conveyance and management systems were not limited to Patan, but are prevailing in almost all of the Newar settlements in the valley and beyond. The Kathmandu system is almost lost in the course of its intensive urbanisation, Bhaktapur is also in the verge of collapse, and so are the cases of many smaller settlements. Patan is relatively different in this context. The second largest city of the valley; the old settlement of Lalitpur are still partially relying on water from stone spouts and wells. Moreover, the cultural linkage to traditional water management is still continued, though it is losing its ground slowly and gradually. Rato Matsyendranath Festival, the festival of water god is yet another important character of Patan. The most encouraging part of Patan is the recent development in Lalitpur for the conservation of traditional stone spouts and ponds. From last two years, there is a changed mindset at people's level to conserve the resources which is also dragging other settlements like Kirtipur, Thimi, Bhaktapur and even Kathmandu.





Water Movement in Patan with reference to traditional stone spouts

THE HISTORICAL CONTEXT

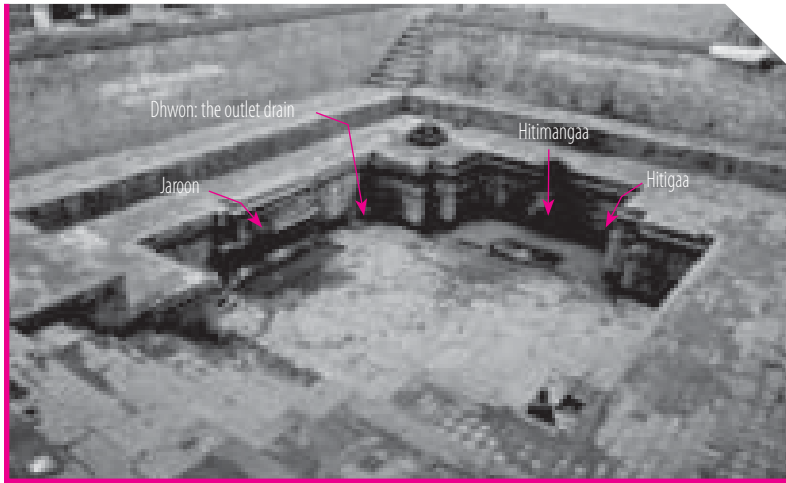
The traditional water system of Newars

Like in all Newar settlements, water conduits for fetching water for household purposes were primarily stone spouts and dug wells in Patan. 400 traditional stone spouts were recorded in Kathmandu Valley in recent study. There were 58 stone spouts in Patan and its surrounding, of which 4 are dry and 7 are not existing (NGOFUWS, 2006). Most of these spouts are located in the core of the historic settlement. Few of them are outside the settlement, serving to the passer-by as well as irrigation purpose in those days. Similarly, there were approximately 220 traditional dug wells in Patan (Arnstoerm, E. KV 1994), many of them still exists.

TABLE 1. Stone spouts in Kathmandu Valley

SN	MUNICIPALITY	WORKING			NOT EXIST	TOTAL
		NATURAL	NWSC PIPELINE	NOT WORKING		
1	Bhaktapur	33	35	18	1	87
2	Madhyapur	49	6	8	3	66
3	Kirtipur	10	0	0	3	13
4	Lalitpur	47	0	4	7	58
5	Kathmandu	106	3	34	33	176
Total						400

Source: NGOFUWS, 2006



Typical gaa hiti

Photo courtesy NGO Forum

PLATE 1

Gaa hiti: The stone spouts

Prof. Tiwari explains the word *hiti* has the origin with Kirats. *Hi* stands for moving and *ti* is the degeneration of *tila* or conduit (Tiwari, S. R. 2002). *Gaa hiti* are the *hities* at depression. They are constructed in a large pit on ground so that the sub-surface flow of water can be spouted out for convenient collection. Their sources can be local aquifer or transmitted to the spot through natural sub surface flow or in manmade channels. These engineered *hities* may also have filtration systems placed before the stone spout. One *gaa hiti* can have one or more spouts based on water discharge and the number of users. Several stone spouts may be installed either by bifurcating the main source into several outlet spouts or use different aquifer sources so that the risks of drying is minimised.

Gaa hiti will have centrally located stone spout on one (or more) side wall hanging about a meter so that water can be directly fetched in water vessel, *ghā* and take bath with convenience. The base platform is normally paved with stone with side drain. The outlet drain is normally taken out of the settlement and used for irrigation. In some cases the waste water is again allowed for sub-surface flow to charge next downstream, a unique example of water management. The side walls are normally stepped with more than about a meter of trade. These steps not only bring slope stability of the peripheral walls but provide space for sun bathing and drying clothes.

When one observes a *hiti*, it not only gives the picture of engineered water conduit, but lavishly designed religious master piece of architecture. Even the mediocre stone spouts on the walkway to fields, the water conduit will have beautifully carved *hitimangaa*, few of idols of water related gods, creatures, properly located with their religious beliefs and functions. Tusaa Hiti in the inner court of Patan Durbar Square is one of the magnificent master pieces in terms of architecture. Therefore, both from cultural and archaeological view points; stone spouts are both the lifeline and ornament of these historic towns.

One more form of stone spout is prevalent in the valley popularly known as *jaron* (deformed in Newari from Sanskrit word *Jaladrwoni*). This is a stone water tank, mostly constructed by a single stone, with one or more tap holes. These holes provide water to the passer by. There are *jaron* also arranged for domesticated animals like cows. Construction of water conduits like *hiti*, dug wells and *jaron* are considered as pious acts which give recognition in the society and believed to be a deed considered for next incarnation.



Jaron no more in use at Mangā Hiti

PLATE 2

Tun: The dug wells

Dug wells are very common in Kathmandu Valley as a source of water for domestic purposes. Built with brick masonry wall, normally in circular shape, these wells collect water from shallow aquifer, normally 4 to 6 meters deep. Based on the water quality and depth of water in the well, some wells are very popular while others are used for secondary purposes like washing and cleaning. A rough estimate of more than 1000 such wells can be found in Kathmandu Valley. Unlike in *gaa hities*, dug wells are not directly linked with traditional ponds and canals, as they do not drain the water directly into the well. However, infiltration of pond and canals are obvious from the drawdown of the well water after the recent destruction of ponds and canals. Focusing on stone spouts, this book will not be discussing much of dug wells, which perhaps require separate initiatives, a future intervention that is very much in need.



Tun, the typical traditional public dug well

PLATE 3

Pukhu (Pokhari) or the ponds

To feed the sub-surface aquifer of most of the stone spouts and wells, ponds were constructed. *Pukhu* (in Newari) and *Pokhari* (in Nepali), the ponds are also part of landscape of Newar settlements beautifying the neighbourhood and providing open space to the clustered setting of the settlements. As per their location and thus the use, they may be categorised into ponds outside the settlements and ponds within the settlements. External ponds, especially those located in the higher elevation to the settlements are meant for recharging the aquifer as well as serve as the reservoir for feeding irrigation canals. Lainchaur Pokhari, Rani Pokhari (Nhu Pukhu in Newari), Ikha Pukhu³ in Kathmandu; Siddhi Pukhu, Bhaju Pukhu, Nā Pukhu in Bhaktapur; and Lagankhel Pukhu, Paleswan Pukhu in Patan are the few examples of external ponds in the valley.

The ponds inside the settlements are relatively smaller in size. By function they serve as the places for washing, cleaning as a direct visible function, but support the settlements by providing buffer to the down pours during rainy season; and more importantly, helps to recharge the ground water particularly to local aquifers. Duck farming and grey water treatment are some of the auxiliary functions they serve to the neighbourhoods. Pako Pukhu, Khecha Pukhu⁴ in Kathmandu and Tekha Pukhu and Khancha Pukhu are the examples for such ponds in Bhaktapur. In Lalitpur Pimbahal Pukhu is one of the best conserved ponds at present time. There are 39 traditional *Pukhus* in Patan alone (Joshi, P. R. 1993).



Pukhu at Purnachandi,
already downsized

PLATE 4

- Ikha Pukhu is reduced in size and is inside the compound of Kanya Mandir School
- Khecha Pukhu is a raised platform at present. The central office complex of Nepal Bank Limited is constructed over Paku Pukhu next to Bhugol Park.



Mangā Hiti: the most ancient working *hiti* (estd. 570 AD) at Mangal Bazaar

PLATE 5

Historical background of water system in Patan

Construction of stone spouts in Kathmandu Valley can be linked to the early settlements of Kirats who have used ponds and springs in the tar lands and hill slopes. Later Lichchhavis have linked the ponds and spouts to discharge water from stone spouts (Tiwari, S. R. 2002). The oldest *hiti* found in Patan is the *hiti* at Mangal Bazaar. Popularly known as Mangā Hiti, this *hiti* was built in 570 AD (Pradhan, R.)⁵ by Bharavi, daughter of Lichchhavi king Mandev. Various legendary stories are linked to this fascinating stone spout.

Similarly, other famous old *hities* are Alkwo Hiti, Nugā Hiti (Sundhara), Thapaa Hiti, Taapaa Hiti, Chyasal Hiti, Tyagā Hiti, Konti Hiti, and many more. At present there are 47 working *hities* in Patan, many of them are in verge of collapse (NGOFUWS, 2006). The core city of Patan is north and north east sloping. It encompasses 36 stone spouts out of which two are already extinct. Many of them are drying up or reduced in discharge drastically.

The three large water works of historic time in Kathmandu Valley were the canals from Budhanilkantha to downtown Kathmandu, the Bageswori canal feeding Bhaktapur water system and the Tikabhairav canal feeding the ponds of Patan. The massive water works of Patan was established at various periods of Lichchhavi Rule (Tiwari, S. R. 2002) and extended during Mall period. Although there is an absence of written references of the installations of the water works, the cultural activities, festivals and *pujas* started during the rein of

5. An inscription found at Hadigaon dated SS 472 (550 AD) mentioning about stone spout is so far the earliest available record in the valley. But the oldest existing Dhunge Dhara is Mangā Hiti of Patan dated SS 492 (570 AD) which was built by Bharavi.
6. P R Joshi has reported 34 *hities* in his report on Feasibility of *Rajkulo*, 1993. The recent study of NGOFUWS showed several more. Some *hities* are known with several names. The latest data of NGOFUWS (2006) is considered here. Four working *hities* are outside the study area.
7. Lichchhavi ruler who established Saptapatal Pukhu and started Meen Nath Jatra before Matsyendranath Jatra by King Narendra Dev. Based on communication with Purna Sthapit, Chairperson, Lagankhel Environment Improvement Organisation.



Lichchhavis logically prove that the system was already there to have the rituals. Lichchhavi rulers Amsuverma (Tiwari, S. R. 2002), Balachandra Dev⁷, Narendra Dev (Tiwari, S. R. 1992), Dhruva Dev⁸ are some of the names referred to the water works of Patan out of many. Lunkhusi and Hakha Khusi are still in the memories of older generation of present time that use to pass through the main town of Patan⁹. It can be suggested that this massive system was obviously not constructed during the time of a single king, but was gradually added and improved during the time of Lichchhavis and their successor Mallas. The canals and ponds were also improved (and altered) by Ranas as well. Several of these drains were covered by Ranas with brick arch canals.

The traditional water network of Patan

The traditional water system has five major components:

- the intake,
- the conveyance system – surface or sub-surface flow channels;
- water storing cum recharging body – the *Pukhus*;
- water conduits- the *hities* and wells; and
- the drainage system.

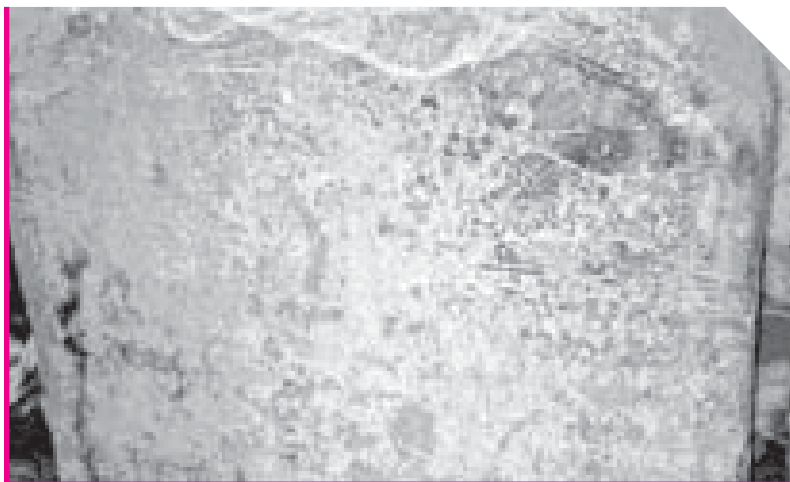
The following paragraphs deals with these components in the case of Patan.

The city of Patan is settled on the northern sloppy terrain of Phulchowki, the southern hills of Kathmandu Valley. Two drainage lines Nakkhu and Kodku borders the watershed where the city of Patan is on the northern most edge of the watershed. The northern border is Bagmati River. The historic water works of Patan includes *rajkulo* (or the *deidhā* in Newari) linked to *pukhu*, the ponds and then to water conduits.

Rajkulo and city canals

A multipurpose canal was built from upstream of Tikabhairav some 16 km south of Lagankhel channelling water from Lele and Naldu rivers. This earthen canal while irrigating the fields and serving the settlements on the way, is brought to the cascade of ponds at Lagankhel. After charging several of the *Pukhus* of Lagankhel, the overflow is channelled to Paleswan Pukhu at Pulchowk¹⁰. When this pond is also filled including the neighbouring

8. Communication with Senior Scholar of Culture Mr. Satya Mohan Joshi. His reference was the stone inscription next to the Ganesh Temple at the start of Momadu Galli heading towards the back of famous Krishna Temple of Patan Durbar Square. Based of the location of the inscription with carving of fish symbolising perennial flow of water, there must be a canal flowing water along present lane linking Mahapal with Kwalakhu of Patan.
9. Lunkhusi is the canal starting from Lagankhel Pukhu flowing towards east to Kanibahal and follows to Lunkhusi Tole and ends at Lunkhusi Pukhu, the pond at present is 'conserved' by paving stone and fenced. Hakha Khusi is the canal flowing from Lagankhel along Naudwon, passing Chakrabahil road into present narrow lane and again follows the road from Saugā to Mangal Bazaar and turns to Bhandarkhal Pukhu. Matsyendranath chariot when reaches this place changes his Dhoti resembling the crossing of the water canal as explained by Mr. John K. Locke in his book *Karunamaya* (1980), Sahayogi Prakashan, Kathmandu.
10. Literatures contradict on whether Paleswan Pukhu draws water after Lagankhel or there was bifurcation of the main canal at Tikhedawal area to bring water to Pulchowk separately. The later might be the case after the improvement of the system in later period. Refer Thiophile & Joshi (1992) and Joshi P R (1993).



The stone inscription at Mwo Madugu Galli, Patan with sketch of fish at the top

PLATE 6

pond called Poda Pukhu, the overflow runs to Pimbaha Pukhu. A sub-channel is linked to Purnachandi Pukhu as well. Once the Pimbaha Pukhu is filled, the excess water is drained through a canal called Nhyandha (meaning drain with fish) along present Ashok Party Palace and ultimately discharge into Bagmati River after irrigating the surrounding fields.

Next canal starting from (or continues from) Lagankhel Pukhu passes Prayag Pukhu and follows to Bhandarkhal Pukhu in an open drain. Topography shows that this is the ridge line which can serve on both sides of the slope. After Bhandarkhal, the drain is made underground and flows to Chyasal and ultimately in Bagmati. The open drain popularly known as Hakha Khusi (meaning drain flowing through Hakha Tole) is still in the memories of old generation of today.

Dhruvadev, administrator of Lichchavi time, installed an inscription next to the Ganesh Temple at the end of Mwo Madugu Galli is the only inscription with a sketch of a large fish. There should be canal in historic time which describes the perennial flow of water¹¹. These informations helps to conclude that there were several canals flowing through the city which serves water for washing, cleaning and similar purposes. Similar system still exists in Sankhu, and believed that such system was there in Chapagaon until recent past.

Shallow aquifers: the source of water

Hities and wells are charged through shallow aquifers. Some *hities* are located next to the aquifer while others are connected to the far away aquifer, linked by burnt clay or wooden channels. The superb way adopted was recharging these aquifers by *rajkuloes* so that the double benefits can be achieved. Three major aquifers found in Patan are Naricha, Nayekhyo, Khwyebahi. There are other smaller aquifers in Patan core area near Guita, Ikhachhen (Joshi, P. R. 1993) and Kiri Keba. These aquifers must be the outcome of the special geological formation where the northern slope of the topography helped to punch confinements and

11. From the conversation with Mr. Satya Mohan Joshi, Senior Scholar of Newari Culture. There is a possibility that the Hakha Khusi could have passed through this lane in earlier time or a separate drain flowing from Mahapal area.



made possible to store water in the sand reservoir. Naricha is the largest such aquifer. The older generation remembers the days they use to drink water in Naricha where they punch the ground with a reed stick about a foot and suck the ground water¹².

Water conduits: the *hities*

From the aquifer, water is channelled through burnt clay channel (or *hitidun* in Newari) up to stone spouts. In some places, wooden channels were also found. Before entering into the stone spout (or the *hitimangaa* in Newari), there may be filtration system. Several types of filtration systems were found where they use sand of various grading, gravel and even charcoal (Joshi, P. R. 1993; and Becher-Ritterspach, R 1994). In Kathmandu even *Lapsi* is being used for water treatment from Lichchhavi time (Tiwari, S. R. 2002). To elongate the contact length for water treatment, several designs were adopted including the *Swastika* shaped sand filter as shown in Plate 8. (Becher-Ritterspach, R 1994). The filtered water may be delivered through one spout or provided a distribution vessel (known as *athah* in Newari meaning the washing pot made of burnt clay) to distribute the water. In some cases stone vessels may have been used. In this distribution vessel, holes may be provided at different levels so that the lowest connection provides adequate flow, while the other spouts discharge only when there is sufficient inflow into the vessel. The joints are normally sealed with *gathucha*, the impermeable clay lining.

Drainage of water conduit is yet another important feature in the water system. Many of the traditional *gaa hities* as constructed in depressions have collapsed because of the damaged or clogged drainage. Obviously, in flatter terrain, drainage is equally challenging. For example Mangā Hiti, Elahne Hiti and Saugā Hiti in Patan are fighting for survival because of the problems in drainage system. Normally *dhon*, the drain outlets are provided in *hities* which discharge the water to agricultural fields outside the settlement after the slopes. In some cases, this water is collected in a pond so that it can be utilised for other functions like washing agricultural products, duck farming and similar auxiliary functions. Moreover, these ponds provide buffer



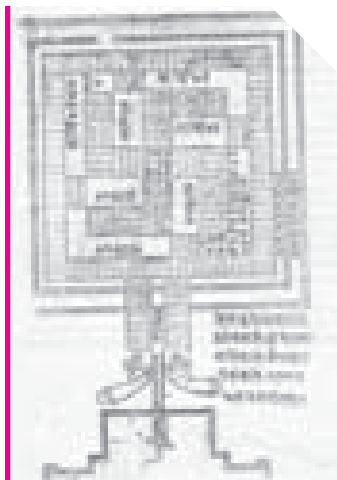
The stone flow distributors at Mangā Hiti and Sincha Hiti, left unattended after its replacements in recent time

PLATE 7

12. Personal communication with Mr. Purna Man Shakya of Thapaa Hiti.

and also helps in reducing the flow by recharging the ground and by evaporation.

The artistic and architectural part of *hities* is yet another area of study which demands serious attention from art, culture and archaeological view points. Mr. Raimund O A Becher-Ritterspach in his book *Water Conduits in the Kathmandu Valley* has elaborated this topic with fascinating facts and figures. The spatial location, the functionality, the religious use and cultural hierarchy, are some of the important aspects of stone spouts in Patan, as in all other Newar settlements.



The water filter system and pair of hands sketched in a folded book known as *thyasaphu*.
(Courtesy: Becher-Ritterspach, R 1994)

PLATE 8

Establishing *hities* are considered as pious act in Newar culture. It is interesting to note that most of the *hities* are not referred to royals as in the case of temples and shrines. Perhaps this revered deed is more communal and local initiations are more important. Therefore, service motive of individuals must be the reason for installing *hities*. From the arts and artefacts preserved in *hities*, it is very clear that a *hiti* construction is not a one time job. They have accepted continuous supplements along with the time.

After the Lichchhavis, Mallas intensified the Newar towns superimposing additional lanes and grids. To serve the enlarged population, more *hities* were added during Malla period. Jitamitra Malla of Bhaktapur, Pratap Malla of Kathmandu and Siddhinarshinha Malla of Patan are particularly famous for the water systems in these three cities.

Traditional water management system

From management view point the five components of traditional water works may be grouped into two: the directly associated and indirectly associated components to the beneficiaries. Directly associated components are the down stream components like *hiti* or well, the surface or sub-surface structure bringing water to the spout and the waste water drainage that allows the utilisation of the resource. These components are of local interest to the immediate users. Clogging of drainage does not hamper the water use in other *hiti* directly, nor the breaking of conveyance channel. Also because of the scale of work and scale of space, by nature these elements are very local. They have specialities like Saugā Hiti compelled to sunken for more than 6 meters but Sundhara elevated to ground. One could have better taste and the others have better discharge. Therefore, the management of directly associated parts are easier as it quickly shows the affect of management (or mis management). Therefore, in the earlier time, local *guthies* were created to maintain particular *hiti*. Normally, three levels of managements may be observed in traditional systems.





The *naga puja* still performed at Bhailagaa, where the cotton strip is decorated with serpent shape.

PLATE 9

Family level management

The local beliefs of *naga* and deities related to *hiti* are linked with the cleanliness and management of the *hiti*. Superstitions and beliefs are other tools that were used to maintain *hities*, and its management regulations. While offering *puja* to *nagas*; cleaning the complex and opening the drain are other measures taken once people get sick. People have such a strong belief on the possible mishaps by the furious deities when their habitat is damaged that even opening and cleaning water conveyance channels and other elements are done with the offer of *Kshyama Puja*¹³. Damaging the water works is not even thinkable in those days.

Neighbourhood level management

The *guthies* set for *hiti* management are either established primarily by the founder like in the case of Bajracharyas of Alkwo Hiti, Sinyaa Shresthas of Sundhara, Wonah Shresthas of Taapaa Hiti or designated to particular group of people like in Chyasaal Hiti to the Tepye to look after *hitigaa* and internal elements are taken care by Shakyas. Whether it is the descendants of the founder or the others, *guthi*¹⁴ was the system adopted for the maintenance of the system from Lichchhavi period. The maintenance is not limited to the *guthies*, but

13. *Kshyama Puja* is the *puja* offered to the deities to forgive that if something was done wrong it was unintentional.
14. Prof. Tiwari explains the significance of *Guthi* in his unpublished article Transforming Patan's Cultural Heritage into Sustainable Future; "The institutionalisation of management, operation and maintenance of religious, social and cultural artefacts and activities in an area appears already well developed as the Lichchhavi inscriptions appear in the scene at Patan or other places in the valley. This was done by the system of 'Gosthi' or 'Gosthika', which was a corporate body 'financed to perpetuity' through land grants or other 'fixed deposits'. Such bodies were created both by the government and private citizens to see to it that the operation and maintenance of the artefacts and activities sep up as a community service by them did not suffer in future either for lack of fund or after their death. The institution of the Gosthi had built financial and institutional sustainability of such surety that they have survived to this day as the *Guthi*." The document further adds, " the cultural tradition of the *Guthi* has been crucial in developing, operating and sustaining the town's religious faiths, it was the *Guthi* and its structuring that led to the overall sustenance of community services buildings, water supply, cleanliness and drainage. *Guthi* effectively channelled 'individual wealth' into public endowments managed by committees recognised as permanent entities. It is important to note that the rights of the donor ceased with the formation of the committee and it was the rights of the latter that continued to perpetuity..."

the whole neighbourhood is mobilised to maintain the local water system under the leadership of the *guthi* to come together and clean the *hiti*.

It was found that different auspicious days were used for the *puja* and maintenance of *hities* by the *guthies*. Yenya Punhi, (the full moon in September) and Khai Sahnu (the New year day of Bikarm Era in April), Nag Panchami (the 5th day of the new moon in August); Fagu Punhi (the full moon in March, the day Karunamaya Jatra starts); Disi Charhe (the day before full moon in January) are some of the days dedicated for the *puja* in several *hities* by the respective *guthies*. The most common day of water works maintenance is Sithinakha, one of the driest day in June. Even if there is special day for cleaning and offering *puja* to specific *hiti*, Sithinakha is the national day of water works maintenance in this valley and in Newar culture. The important feature of the day is that there is no limitation of particular caste or creed to maintain water works (including *hiti*) on this day.

City level management

Management, operation and maintenance of the upstream elements of the system was also challenging at that time. Since there is remote link (thus the affection) to the common elements of the water system, larger system was established for the maintenance of these components. These city level infrastructures were maintained under the leadership of city level institutions. These institutions were not necessarily the state owned institutions, but the involvement of state was unavoidable in such a large system. Festivals were created (or utilised) to draw attention to these infrastructures. In case of water works of Patan, Bungadyo Jatra (Rato Matsyendranath Jatra), the longest *jatra* of the valley is directly linked to water management. There are links to water bodies like ponds and *hities* that need to serve various activities of the *jatra*, making them maintaining the water works. For example, the La Pukhu of Pulchowk is the place where the cane used for making the *ratha* needs to be wetted. Similarly, the Thapaa Hiti is used to wet the materials to make *Bau Pichaa* by the 12 *nayos* of Karunamaya. All major ponds of Patan charged by the *rajkulo* need to be filled with water before the fabrication of the *ratha* of Matsyendra Nath at Pulchowk. All the locations where



The Bungadyo Jatra in Patan: Chariots of Matsyendranath and Meennath

PLATE 10



the *ratha* is halted are next to the water bodies like Pulchowk, Gaa Bahal, Sundhara, Lagankhel and Jyawalakhel.

All these water works are related to the great water works of Tikabhairav *Rajkulo* and Lagankhel *Pukhus*. People from various *toles* and different castes were given specific responsibilities in the *jatra* and its processes, perhaps to unite them and harmonise like in an orchestra. Thus, Rato Matsyendranath Jatra is not limited to cultural activities, but incorporates essential mundane activities required for the maintenance of water works (Tiwari, S. R. 2002). It is interesting to note that the functions were distributed not only to the citizens of Patan, but beyond Patan to Bhaktapur, Thimi, Bode, Nagadesh, Kirtipur, Panga, etc. (Locke, J. K., 1980) showing their stake in the construction and/or maintenance of this great water works.

The largest level management, perhaps the major maintenance is scheduled for every 12 years which are still commemorated every 12 years by visiting the whole population to Bungmati. Besides, there are practices of going for mending and maintaining the *rajkulo* every year by several *toles* as a mass work. People from Sundhara still remember the days before and even some years after the construction of Ring Road that they go in mass from several *toles* to maintain the *rajkulo* up stream to Lagankhel *Pukhus*, even beyond Chapagaon¹⁵. The rituals related to Prayag Pukhu during Gai Jatra Festival, special functions with Paleswan Pukhu, Tā Pukhu and Pimbahal Pukhu also shows its importance to the society than other smaller and downstream *Pukhus* (Becker-Ritterspach R., 1994). Apart from Rato Matsyendra Nath Jatra, there are several other rituals and functions that support maintenance of ponds and spouts. One good example to quote would be the payment of one out of twelve heaps of rice to the *podes* of Pode Pukhu for bringing lotus flower and fish to Siddhilaxmi temple at Purnachandi from Paliswan Pukhu of Pulchowk in August¹⁶. This ritual must be underpinned to conserve the pond ecosystem.

In conclusion, the foundation of management was on water need and users fuelled by culture and religion, standing over beliefs and volunteerism rooted into communities and evolved in festivities and rejoices.

.....
15.....Communication with members of Prabhat Pariwar Club of Sundhara.

16. One the first new moon day after Indra Jatra (in August / September), 12 rice heaps are offered to Siddhilaxmi at Purnachandi. In this function, the *podes* residing next to Pode Pukhu should offer lotus flowers and fish harvested from Paleswan Pukhu. They are paid by one heap of rice for their service. This ritual shows the traditional system of linking jobs, management of public amenities

THE MODERN MISMATCH

The piped water in Patan

The first piped water taps

One of the unfortunate happening in Nepalese history is the victory of Kathmandu Valley by the khas rulers from the hills who were relatively inferior in culture, science and technology. All their predecessors who ruled this valley were absorbed by the civilisation of this valley where the rulers were fusioned, and became part of the Newar nationality. Perhaps, the new rulers could not digest the superiority of the locals and used other tools to establish their supremacy. Unlike the Malla rulers, they were remote from the people. In the later time, when Ranas were the de facto rulers, being close to then British India rulers, started importing western technologies to solve the problems. These rulers having less respect to the indigenous knowledge of resource management; started copying the technology in a blind manner. Construction of Phohara Durbar (meaning Palace with water fountains) in Kathmandu could be a representative



One of the public spouts installed by Ranas in Patan

PLATE 11

and incentives. Based on the information given by Er. Pushpa Das Mulmi of Purnachandi.



example where the rulers destroyed the traditional water recharge system and diverted the water to beautify their elite homes¹⁷. Aloof from people, they tried to establish their supremacy by importing the technology at the cost of existing ones.

After establishing piped water system in 1895 in Kathmandu and Bhaktapur, Lalitpur observed first such system in 1904. Beer Samsheer, the then prime minister introduced public taps collecting water from Doodhpokhari source on the west. Several stand posts were installed to serve the public. Later Chandra Samsheer added more taps. These taps were a by product of their intention to reach several palaces surrounding Patan like Shanta Bhawan, Ananda Niketan, Maan Bhawan, and many more¹⁸. Besides public taps, few private taps were also installed in the houses of influential officers of that time.

The municipal water supply

Municipal water supply to individual houses was distributed rather late in Patan. Private taps were distributed only after 1960 under the water work office called Pani Goswara. Earlier, it was taken as a luxury to have taps at home while one can fetch water from the stone spouts for free. As the population grew, the habits started changing and the demand of water in Patan started increasing. Bhajangal reservoir was added in the system. In the course of time several other sources were added to meet the demand in Patan.

Table 2. Municipal Water Supply Initiatives in Lalitpur ¹⁹

YEAR	ACTIVITY
1905	Beer Dhara: the piped water system was introduced.
1960	Pani Goswara started distributing private taps in Patan
1970/71	Sundarighat sumpwell was added into the system
1974	Pani Goswara converted to Nepal Water Supply and Sewerage Committee under Committee act
1976	Chapagaon Muldole scheme added to Lalitpur system
1979/80	Saat Mul and Pherping system including two deep wells were added to Lalitpur system
1984	The committee is again converted into Water Supply and Sewerage Corporation
1989	Nepal Water Supply Corporation established
190/91	Basuki and Deuki schemes added
1992/93	Naldu scheme added
1993/94	Charghare Pumping Scheme added at Chapagaon
1995	Tahakhel reservoir enhanced to store more water

With all these efforts, the demand of water is not met by the municipal water system. There is an acute water shortage in Patan, as in most of the other parts of the valley. Therefore, stone spouts and public wells are the reliable sources for them. Although the municipal tap coverage in Patan is high, the scarcity is forcing them back to the *gaa hities* and wells.

17. Personal communication with Mr. Tirtha Narayan Manandhar of Kamilachhi, Kathmandu.

18. Based on communication with Mr. Chandra Lal Nakarmi, Chief, NWSC, Lalitpur Branch.

19. Based on NWSC publications, communication with Mr. Chandra Lal Nakarmi, and Mr. Chandra Krishna Shrestha, NWSC.

Piped water in Patan is inevitable to meet the demand of increasing population and change in socio-economic condition of the city. However, the initiation of municipal supply came as an easy substitute to the traditional water supply system. The pride and convenience of having water tap at home made the community easily betray the traditional water supply system. One by one they shifted from traditional sources to the municipal supply. This has left the spouts unattended and poorly managed. Some stone spouts could attract people because of the taste of water that they are used to with. Elderly, destined to these spouts to collect *nilah*, the pure (or sacred) water for their daily *puja* and rituals. In other cases, stone spouts became alternative source in the absence of water storing tank or because municipal supply was for morning hours only. Therefore, for washing clothes and taking bath, stone spouts still played important role. Moreover, to the poor households, those not having municipal tap or the poor renters, stone spouts were still reliable source of water. This has become even important as the municipal supply became more and more unreliable and uncertain.

The recent encroachments

In the absence of ownership, both at local level and city level, the traditional water supply system fell down slowly and gradually. The state became unaware and indifferent in understanding the traditional system. The subsistence economy of the country could not generate attention to this precious knowledge, the structures as well as the system as a whole. We lost many things; water management system is one of them.

Among all, the weakest point of the city management from recent past is understanding of land use in general and urban land use in particular. The ecological contexts and environmental services that land (and its different forms) is providing were not understood by the managers. In the changed context where Kathmandu need to cope with influx of migrating people, land is understood as property and capital to gain. The profound knowledge of land and its use developed by the Kirats, enriched during Lichchhavi Period and extended by the Mallas was overshadowed by the rampant poverty in understanding land and its uses, both by the state and the public in the later period. Comparing to other cities in Asia, perhaps Nepal has very limited land that is owned by the state. Those public lands, which was kept with the state to safeguard its proposed use, were either grasped by the influential people in the government or brought in use other than its ecological and historical purposes. Moreover, community institutions like schools, clubs and neighbourhood organisations also have encroached such land and spaces for extra-ecological purposes. The examples are the Sajha Bhandar Building constructed over *hiti* at Bhotahiti, The RCT Club building constructed over a *gaa hiti* at Kamilachhi, Nepal Bank Limited constructed over Pako Pukhu, City office of Lalitpur over Paleswan Pukhu, and many many more. Not only these, several schools and colleges, shopping complexes and roads are constructed over the traditional infrastructures which use to serve various services including water works.





Government office
erected over Poda Pukhu,
Pulchowk

PLATE 12

Destruction of Pukhu

The knowledge and skill of recharging ground water to serve wells and *hities* was well established in earlier time. The location of *Pukhus* like Rani Pokhari, Lagankhel Pukhu, Siddhi Pukhu in three Tundikhels of the three cities and many more depicts the understanding of then city managers in ecological water management.

Mr. Prayag Joshi has listed 39 *Pukhus* in his report of *Rajkuloes* of Patan (Joshi, P. R. 1993). Almost all of these ponds were part of the water management system. Some of them also served as waste water management, especially the grey water management. Out of the 39 reported *Pukhus*, 16 are relatively in good condition from shape and size, 9 are encroached for other uses reducing the size drastically, 14 are completely lost for public or private purposes.

Out of the 23 encroached or lost *Pukhus*, 8 were encroached or “reclaimed” for public schools; 3 for government office buildings and others were for public utilities like public toilets, bus parks, etc. Tã Pukhu (meaning large pond in Newari) next to the main road to Lagankhel was roughly 16 *ropanies*²⁰ is reduced to hardly 2 *ropanies* area at present. This can be seen as one of the devious act that is prevalent in the land management offices of the government. Moreover, if Lagankhel case is observed, all the public buildings, whether military camps or electricity office; transportation office or mental hospital; land revenue office or district court; school or bus park; market centre or road network; it is the encroachments of the traditional *Pukhus* and its peripheries. A case study is presented about the encroachments in Lagankhel in Chapter 5. Annex C provides the present status of *Pukhus* in Patan.

Pukhus that are intact in size and shape are the *Pukhus* which are inside the settlement. Here *Pukhus* have their functions as a part of urban infrastructures. However, in recent time, when people are shifting to other professions from farming, the direct uses of *Pukhus*

20. Ropani is the local unit of land equivalent to 5476 sq. ft.

are limiting. This might be the reasons of filling the pond to create a garden, as in the case of Purnachandi Pukhu.

One more change is observed in *Pukhus*. Newars had unique waste management system. Private toilet was not the practice of Newars, but they go to designated areas called *khichamugā* or *malā* some distance outside the settlement. Preventing ground water pollution; this practice have link to resource recycling in the then agrarian society. But in recent days, toilets are constructed at home and the waste water is either discharged into in-house pits or linked to sewerage network. The effluents are leaking (or some times directly connected) to ponds. Because of eutrification, pond ecosystem is destroyed and they are filled by the debris of the excess growth of the vegetation.

Thus the ponds which collects surface water and recharge the aquifers, are lost because of ignorance, change is habits and economy, and greed of the people. These are some of the main reasons of the reduction of discharge or drying up of some of the wells and *hities* in Patan.



Paleswan Pukhu: the lotus pond was encroached for municipal building in Patan. The pond has drastically reduced in size.

PLATE 13



Prayag Pukhu, one of the important pukhu on the flow path of traditional *rajkuloe* and *hities* is now encroached to house a school and sports complex.

PLATE 14



Disturbance of underground water path

It is obvious that the discharges of water in traditional wells or stone spouts are from the shallow aquifers. These aquifers are disturbed by recent construction activities. The activities that could have negative impact in the subsurface flow of water in the aquifer are construction of foundation for large buildings, construction of drainage and pipelines crossing the aquifers, construction of shallow wells, etc.

Many people reported that the construction of sewerage system in Patan under IDA loan in 1978²¹ onwards is one of the major causes of flow reduction in some *hities*. It was reported that while laying the concrete hume pipes crossing the flow path of the aquifers, they have removed the sand layer and replaced by the concrete pipes. Moreover, some even argues that during the construction the traditional burnt clay channels were also broken. After 1978 there was a trend of replacing surface drain by buried hume pipes all over the city. In the absence of participation of local people, there indigenous knowledge was not heard by the contractor who was obviously guided by the contract documents. Later, NWSC, municipality and local people also added the lengths of sewer lines. No accounts of these sewers are available nor are there proper management plan. Construction of such drains could have three possible implications to traditional water systems. First would be the obstruction to natural flow. Infiltration of the aquifer water into the drain is another tragedy that could easily happen. The third effect of such sewer lines, as it is reported in the case of Saugā Hiti that the exfiltration of the sewage into the *hitidun*, thus delivering the polluted water through the *hities*. The worst case was observed in Jywalakhel Hiti where the *hiti* is discharging merely the leakage of sewage flowing above the *hiti*. All these cases are equally true for dug wells as well. However, no studies are made on these issues so far.



Laying of sewerage line need to consider the ground water flow path

PLATE 12

21. This sewerage construction was done by Bhandari Builders. Therefore people refer these constructions in reference to this contractor.

The second negative intervention into the system is the construction of large buildings which requires deep foundation. It was reported in the cases of Thapaa Hiti, Chysal Hiti, and many others that their *hitidun* passing through private land or building. With deep foundation there is a good chance that these water channels can be destroyed knowingly or unknowingly.

Moreover, construction of basement has also started in the core of Patan. Since this fact is overlooked so far, serious attention is required in this aspect as well.

Not to limit other areas from their opportunities to efficiently utilise underground space, studies may be required to demarcate the subsurface flow pattern.

Wells are normally public utilities in earlier time perhaps because of the technological limits, and the resources required. Shallow dug wells became popular in Kathmandu Valley in last two decades with the availability of concrete rings, cheap electric water pumps, and convenient plastic water tanks. Digging a shallow well costs around eight to ten thousand rupees. This investment became attractive as the household could be self-reliant in water. The regular uncertainty of city supply attracted people towards the construction of dug wells. In the absence of regulating mechanisms to manage ground water, dug wells became popular in Patan, especially for those who can afford and have some space for such facilities. Unfortunately, this became one of the major reasons for the decrease in the discharge of *hities*. The wells on the subsurface flow path of ground water enjoyed the water in their wells arresting the flow in the deep holes. This became the major concern in the areas where the natural aquifers feeding the stone spouts are located like in Naricha, Nayekhyo, Kiri Keba, or Nyakha Chuka.





Water Movement in Patan with reference to traditional stone spouts

PRESENT WATER STRESS IN PATAN

The NWSC supply

Nepal Water Supply Corporation is supplying water to Patan through the Saibu reservoir and Tahakhel reservoir. These reservoirs are fed from several sources which includes Seshnarayan spring, Naumule spring, Saatmule spring, Kuturi spring, Timauri mul, Kailibu spring, Dudhpokhari Mul, Charghare well, Basuki Mul, Deuki Mul, Nallu intake, Muldole well, etc. The above water is supplied to all the areas of the municipality, adjacent VDCs and some sources are even shared with Kathmandu.



People at Lonla, Patan waiting for NWSC tanker offering water every fifth day.

PLATE 17 



In the recent time, the biggest demonstration of Patan people for water took place in 1977. In this demonstration one person each from every house took part to picket Singha Durbar (the seat of the government of Nepal) with torch in their hands. This demonstration was the seed to the large water infrastructure investments for Kathmandu Valley. The first project of the series of IDA loan was the outcome of this movement. Under the first project two deep wells in Pherping, construction of Saibu reservoir and diversion of Pherping Hydropower water for drinking purpose were made. It was only after this time, Lalitpur observed sufficiency in water, though for not very long. The outskirts expansion of the settlements in Patan mushroomed only after 1990, particularly after 1995, which again brought water scarcity as elsewhere in the valley. Even during this time of scarcity, NWSC have tried to cater some pockets of Patan like Khapinchhen, Guita, Chyasaal areas; which do not have other alternatives of water.

The latest data of NWSC shows that there are 32,000 taps distributed under Lalitpur Branch of NWSC (including Patan and outskirts areas). If 1000 litres of water is allocated for a connection 32 million litres of water is required every day. Adding 35% unaccounted for water the requirement rise to 43.2 MLD. On the other hand present water production in this branch is 27 MLD during wet season and 17 MLD during dry season. Thus the deficiency for present population is 16 MLD during dry and 25 MLD during dry season (NWSC, 2007).

In this scarcity, NWSC need to wait for fifth day to deliver water to each house to built pressure in the supply pipe. Therefore in the city core, all the areas (with few exceptions) get water for two hours on every fifth day. Those who have high capacity pump and large water tank, suck water from the municipal pipe and others, including the settlements in high elevation, are left on their own for their water need. The unaccounted-for water in the system is estimated to be more than 35%; where the leakage covers the biggest share. NWSC is trying its best to deliver at least 1000 litre of water to each house in the city core which makes up around 3 MLD of water every day.

464 million dollar Melamchi Water Supply Project, initiated in 1988 was the only hope for many water managers to quench the thirst of the valley. Even today, this project is at the verge of collapse due to several political, social and managerial reasons. NWSC, which was supposed to be abolished from the valley after Melamchi take over, tried some projects to add water in Patan. However, the endeavour was far behind the population growth. Apart from Melamchi, NWSC and the government is also searching some alternatives to meet some of the demands. Thonse Khola, Kodku project and combination of these are some of the viable alternatives that may be considered by the government in the near future. Notwithstanding, with the urban sprawl expanding to the rim of the valley, quenching the thirst of Patan people will not be possible without serving the peripheral area where the sources are. Therefore, water scarcity is bound to be there in Patan at least for the near future.



Queuing for water at Nā Hiti. Most of the people are poor renters of the area.

PLATE 18

The alternatives

Above paragraphs described the water scarcity of Patan from last several decades. It explains that why people went back to the traditional water conduits. Except in few areas where there is absence of traditional sources or the areas that have already lost their traditional water system, traditional *hities* and dug wells are the last resort for the people. Not only in *hities*, but in traditional public wells, people have developed their own system to collect and distribute water in Patan.



Water stress: carrying water from some 2km away Konti Hiti to Balkumari in Patan

PLATE 19

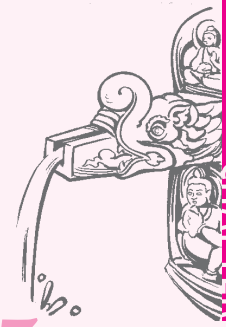


Alkwo Hiti: queuing for water

PLATE 20



Recently, private wells became famous to meet the water requirement, especially for purposes other than drinking. For the urban poor, even the quality did not matter. Tanker service flourished especially among the people who could afford. Thus the left out population was again relying on the *hities*. It is not only the local population that are served by these *hities*, but the people from surrounding areas. It was reported that people from Naya Baneswor and Buddha Nagar area of Kathmandu also comes to the *hities* of Patan like Alkwo Hiti, Mangā Hiti, Kwonti Hiti, Taapaa Hiti and many more. The crowd in the *hiti* is increasing every year, an obvious measure of the increase in water stress in Kathmandu Valley.



MOVEMENT FOR WATER IN PATAN

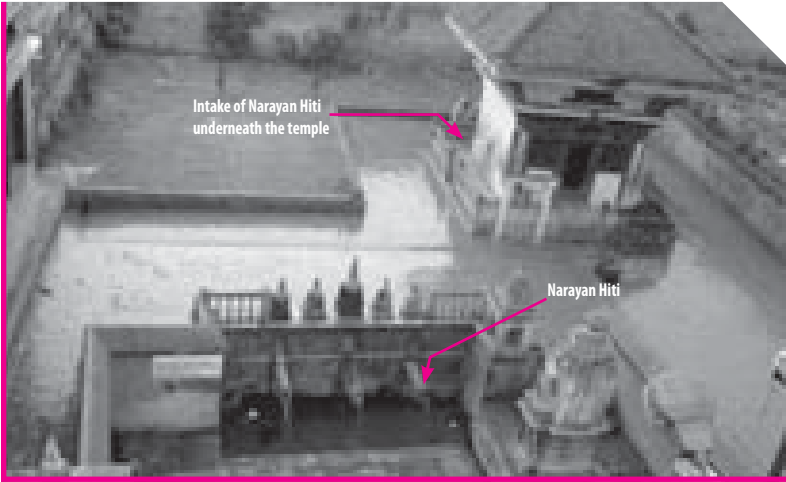
The Alkwo Hiti case

Alkwo Hiti introduced

Alkwo Hiti is one of the highest discharging *hities* in Patan. The yet existing city gate next to the *hiti* shows that this is one of the north-western end of old settlement of ancient Patan. Ikhachhen Tole of present Ward no. 22 of Lalitpur Sub-metropolitan City is the main consumer of this *hiti* water. The silver inscription with the Bajracharya family responsible for maintaining the *hiti* shows that it was established in 535 Nepal Sambat (1415 AD) during the reign of the Mallas. Famous *tantric vaidya*²² of that time Tumha Dev Bajracharya installed this *hiti*. A famous story of the *hiti* is well known to the Ikhachhen people²³. Then onwards the discharge in the *hiti* is continuous. Unlike many other *hities* in Patan, the

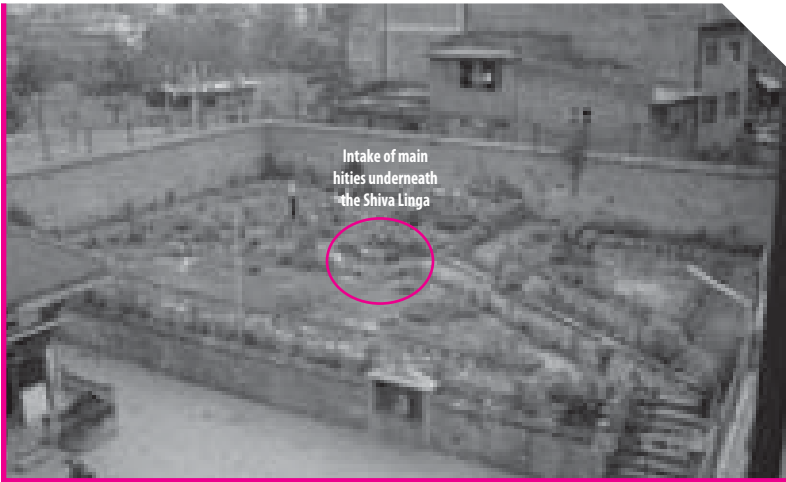
22. Tantric Buddhism was famous in those days. Tumha Dev was famous for his tantric power and medication.
23. There are two stories popular in Ikhachhen with reference to the establishment of the *hiti*. At that time tantrism was very strong. Tumha Dev Bajracharya was one of the famous tantric and vaidya (medical doctor) of his time. One story says that he meditated (Purushcharan Meditation) next to present water spout for 21 days which helped to locate water aquifer. The other story is more like a fiction. A human turned serpent knocked the door of Tumha Dev for some medicine for the treatment of eye disease that his family was suffering from. The tantric gave him the dirt collected from rubbing the back of his ear and gave him as medicine. Surprisingly the 'medicine' helped. The *naga* became very pleased and asked for any gift he need. The tantric asked for some water sources as water scarcity was the biggest suffering at the time. The *naga* gave him three stones and asked him to keep it secret. As instructed he kept the stones in his store and kept the door locked. This raised the curiosity of his wife and desperate to know the secret that her husband is hiding from her. One day the *tantric* forgot the key at home. His wife took the advantage and opened the room. When found just three stones, she was disappointed and threw the stones from her terrace. The three sources of present water spout are the places where the stone hit the ground.





Alkwo Hiti: the *hitigaa* and the hiti complex

PLATE 21



The main aquifer of Alkwo protected under compound walls

PLATE 22



Ikhachhen neighbourhood: proud of their hiti

PLATE 23

aquifer feeding the *hiti* is believed to be the near by agricultural land on the north east, and south of present *hiti*. The aquifer could be the artisan as the southern moderately elevated areas do not enjoy this feature.

It is amazing to note that the *hiti* was constructed with highly engineered knowledge, skill, and wisdom. There are five spouts in the *hiti* complex. Water is flowing through wooden channel (*hitidun*) into the *hitimangaa*. These spouts have different sources. Out of the three large *hities* the right *hiti* popularly known as Narayan *Hiti* has almost constant discharge throughout a year. It is believed that the Ganesh Temple on the north east corner of the *hiti* complex is built over the intake so that the intake can be preserved. The other two spouts are charged from the eastern intake some 15 m from the *hitigaa*. Some 6 m east from the *hitimangaa* one *athah*²⁴ is provided which distribute the incoming water to two wooden channels. At present this *athah* is located next to the garden wall below one of the stone inscription. This *athah* is again linked to a chamber before which a caution stone is placed²⁵, meaning “do not go beyond this point”. It is not known what is there inside this chamber, but it is believed that this should be filter and intake point of the water system. The chamber is covered by brick and lined with *gathucha* (kind of water tight clay). There are two more spouts with lower height (facing west and north). They are linked to southern aquifer. An *athah* located on the south-east corner of the *hiti* complex distributes the flow in these two spouts. Beyond the *athah* people have not explored the main intake of the water which likes in the southern plot of the *hiti* complex.

This *hiti* complex and the surrounding were famous for snakes. Even two decades back the *hiti* complex was inhabited by snakes. Old people remember that the area was full of snakes that they even get snakes flown into the water vessel while fetching water. For the maintenance of the *hiti*, 9.25 *ropanies* of land was allocated for the *guthi* which takes care of the *hiti* complex and offer annual *puja*.

Management system of Alkwo *hiti*

Tumha Dev Bajracharya not only established the *hiti*, he has prescribed some regulations for the maintenance of the *hiti* system. Every year the caretaker must organise *Puja* in the *hiti* on Khai Sanhu, the new year day of Bikram Era. Apart from *puja* the *hiti* must be cleaned and maintained²⁶. While renovating the *hiti*, the inscription mentions not to open particular place covered by a stone at the Navi Mandala. Moreover, this pristine land and its surrounding should not be allowed to:

24. *athah* is a circular vessel of burnt clay used by Newars for washing clothes until the aluminium and plastic troughs were available in the market. The burnt clay *athah* were popular during Malla Period while stone vessels were used during Lichchavi period (communication with Mr. Prayag Joshi) as shown in Plate 7.
25. To protect the *hiti* system it was practiced in *hities* that a stone with pair of palms carved on it is placed which indicates that the maintenance of the system does not need to go beyond this place. There is a belief that if people open or cross this limit there could be any kind of mishap as the *nagas* get angry.
26. The stone and silver inscription of the *hiti* has mentioned the rules and regulations to be followed by the caretakers and the water spout users.

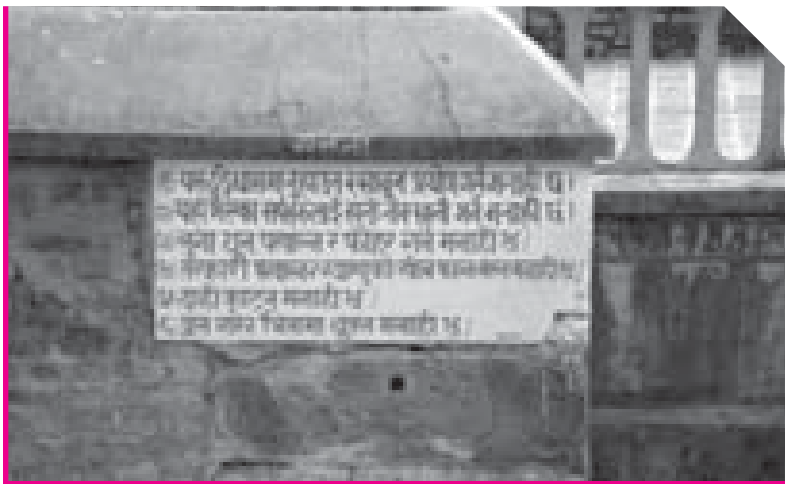


- Throw waste water
- Use of soap
- Throw honey
- Use leather shoes
- Litter the area.

If these misconducts are committed the person has to bear *Pancha Mahapaap* (the five great sins). Apart from other polluting deeds, the regulation also considers the throwing of honey and use of soap, which is very detrimental to aquatic creatures, especially to snakes. This shows their best understanding of the ecosystem. For the maintenance fund, 9.25 *ropanies* of land surrounding the *hiti* was also allocated and a *guthi* was established for the maintenance of the *hiti* for the future.

The descendants of Tumha Dev Bajracharya are still practicing the rituals through their *guthi*. They offer *puja* every year on Sithinakha and Nag Panchami. The Sithinakha *puja* is the major one. However, the land mentioned in the inscription is not available now²⁷. Apart from the *puja*, Ikhachhen people participate every year in cleaning the *hiti* area on Sithinakha. People also offer *puja* to the *nagas* and the deities when they have some water related sickness, especially when prescribed by traditional *vaidyas*. There were attempts to control washing and bathing using soap in the *hiti* complex. Even women during their menstrual period are not allowed to fetch water from the *hiti*.

With the urbanisation pressure, the agricultural land on the north of the *hiti* is already occupied by housing, the inner backyards are filled with additional dwellings. With these changes the users of the *hiti* are also changing. For migrant people in Ikhachhen and many other neighbourhoods, Alkwo Hiti is the major source of water, especially for poor renters. During the dry season, people come from long distance to take bath, wash clothes and even



Public notice: Dos and Don'ts in the hiti area at Alkwo Hiti

PLATE 24

27. Locals also believe that not only these 9 *ropanies* of land, they have more than 14 *ropanies* of land in Baneswor area that was allocated for the maintenance cost of the *hiti*.

fetch water for their petty businesses like tea shops and poultry. In the recent years, perhaps because of the encroachment of their habitat, snakes are rarely seen in the *hiti*. At present, the *hiti* management committee does not allow taking bath with soap and washing clothes inside the *hitigaa*. Moreover, recognising the importance of ecology, the locals have a regulation to not to kill snakes in the area.

Time line of Alkwo Hiti movement

Alkwo Hiti is one of the perennial *hities* in Patan which is believed that it has not stopped since its establishment. Because of the discharge and taste, this *hiti* was famous even during Rana period. Old people remember the hauling of water by the servants of Rana Prime Minister Juddha Samser whose palace was at Jawalakhel some two kilometres from the spout.

The 1961/62 renovation

Present generation remember the major maintenance of the *hiti* took place in 1961/62. They already faced encroachment of the *hiti* area at that time. When they received some 9500 rupees from the magistrate of that time to renovate the *hiti*, huge support was brought in to conserve the *hiti*. People participating the *hiti* maintenance did not limit to Ikhachhen, but neighbouring *toles* like Nagbahal, Talachhen, Salichhen, etc. took part in the maintenance. All the labours for several weeks were voluntary, and offered free snacks who could offer. They cleaned the *hitidun*, and cleaned the channel to improve the discharge. The *hitigaa* wall and platform was also constructed.

Since the aquifer area was encroached by the Poda settlement on the north east and Khadgi settlement on the east, local people used the opportunity to save their land as much as possible. They built present garden and conserved the intake of the major source by demolishing two houses encroaching the area. Clear demarcation of the area is made to protect the *hiti* area²⁸. The southern border of the *hiti* is still in dispute as one of the sources of the *hiti* lies in the central part of the southern cultivated land. This land is owned by the descendants of Tumha Dev Bajracharya. Local people have dispute in use of this land with the tenant and the land owners. Since the intake is just a meter below the ground level, any agricultural practice ponding the area or planting deep rooted trees would damage the water system. There were incidence that once the tenant tried to plant rice, has resulted with muddy water discharge in the west facing spout. He also once irrigated with sewage. In all these attempts, the Ikhachhen people were united to fight against such misconducts. However, in the absence of deeds of the land, it is only the social pressure that is conserving this area. In last decade locals put a signboard in the land saying that this is the intake of the *hiti* and if someone bought this land for construction of house or other purposes should be responsible for the consequences.

.....
28. Interview with Mr. Madan Krishna Juwa, and Mr. Kil Bahadur Shrestha residents of Ikhachhen. Mr. Shrestha was one of the leaders in the renovation work at that time. Mr. Juwa is advisor to neighbourhood committee. He was one of the active participants of the improvement works during 1961/62.



Behind these initiatives, there was a strong local leadership in Ikhachhen at that time. Motivated by left ideology (as it was dominant in Patan at that time), they were united against the Panchayat Regime. Aalok Library was the platform they used for these social causes. The library committee was reshuffled again in 1980, perhaps influenced by the success of anti-Panchayat movement of that time. The third reshuffle was observed in 1995 again after the first Janandolan. This time the committee was organised under the banner of Ikhachhen Tol Sudhar Samiti (meaning Ikhachhen neighbourhood improvement committee). With the given political freedom and state heading towards decentralised governance, the committee was formed to address primarily the physical development of the neighbourhood and bargain with the municipality for their betterment. All these committees were primarily led by the older generation who were active during 1961/62 initiatives. Apart from other developmental activities these committees offered Alkwo Hiti maintenance and conservation activities throughout these years.

Water scarcity after 90s

Patan was never sufficient with water from the beginning of the municipal water supply system. There were several sources added, but always left behind by the growing demand. In 1985, then Nepal Water Supply and Sewerage Committee proposed to install water collection system in Alkwo Hiti and feed the municipal pipes. Locals could not agree as they were afraid that this intervention of the government agency will make them loose the water right of the *hiti*²⁹. Even in 1992, UDLE under its Patan Conservation and Development Programme proposed collecting *hiti* water for redistribution at household level in Ikhachhen and surrounding areas. The proposal included several options (Theophile, E. and Joshi, P. R. 1992). However, the community was not convinced as this was the external proposition to them.

In the changed context people moved from *hiti* and well to personal taps. When these taps became unreliable, those who could afford started digging personal wells. After nineties personal well became popular. However, this attempt was successful where shallow ground water was available in abundance and of good quality. Others still have to rely on *hities* and traditional wells after their unsuccessful attempts. This is also the picture of Ikhachhen. The disadvantaged, again went back to the traditional sources and compelled to think on preserving the *hities*.

The Bone mill incident of 2000

On 10th of August 2000, during the mid monsoon, suddenly people got sick after drinking water from two of the five spouts of Alkwo Hiti. This was due to the leaching of the bone mill waste located about 100 m south of the *hiti*. The monsoon rain washed the rotten bones stored to prepare chicken feed, and infiltrated into the aquifer. The spouts were discharging reddish and smelly water. Dozens of the locals were rushed to hospitals because of diarrhoea, vomiting and other difficulties. Ikhachhen people were trying to evacuate the bone mill owned by people with royal influence from the start of its establishment due to the odour and the water pollution. This incident captured the attention of media, environmentalists,

29. Based on communication with Mr. Prayag Joshi, then district chief of Nepal Water Supply and Sewerage Committee and Mr. Madan Krishna Juwa, then executive member of Aalok Pustakalaya.



Narayan Hiti

The bone mill storing of bones and horns of animals next to the of Alkwo Hiti aquifer.

PLATE 25



Alkwo Hiti crowded for water every day.

PLATE 26



Inauguration programme of the general convention of Alkwo Hiti managing committee.

PLATE 27



politicians, and many more. The youths of Ikhachhen organised into Sher Bone Mill Evacuation Movement Committee to ban the industry from the area.

With the strong pressure from the community, the municipality board immediately ordered to close the industry. However, the Department of Industry tried to resist in favour of the bone-mill. The committee pressurised government offices like Chief District Office, the municipality, Cottage Industry Division, etc. Parliamentarians, municipal representatives, and various social organisations showed their concern on the matter. As these approaches did not work, the movement committee started delegations, demonstrations and picketing. Their movement was supported and participated by neighbouring *toles* too. Ultimately, after the continuous effort of the locals, the industry signed an agreed to leave the area within six months. At present, the industry has moved, but the collection is still continued at the place.

The success of the movement encouraged the youths of Ikhachhen to conserve the *hiti*. Moreover, as the municipal supply could not serve them from more than a decade, they were in search of alternatives to their water needs.

The start of community water service

After the bone mill incidence of 2000, the suppressed pursuit of people of Ikhachhen to conserve the *hiti* emerged as energy. Youths were in forefront and seniors were in backing. This gave re-birth to the community organisation of Ikhachhen which was equally strong and active some forty years back.

Table. 3. Activity time line in Alkwo Hiti Water Distribution System

DATE	ACTIVITIES
October 2003	User's Committee formed
November 17, 2003	Water Supply Project Commenced
March 23, 2004	Project accomplished
March 28, 2004	Started distributing water
March 2005	First public exposure and wider media coverage

Encouraged by the success to remove the industry and polished by the continuous movement of a year, the youths started searching sustainable alternatives to conserve Alkwo Hiti. They started the possibilities of establishing the *hiti* water distribution system which was proposed by NWSC in 1985 and UDLE in 1993. They established Aalok Hiti Conservation and Water Supply Users' Committee (AHCWSUC) and came up with harvesting of water of the *hiti* and distribute door to door. A 7-membered committee was formed under the leadership of Mr. Sushil Shrestha, and started working in the project from late 2003. When their effort of bringing external support could not be successful, they initiated with their local fund with the commitment of more than 50% of the community to participate.

It was not easy at the beginning as adequate fund contribution could not be collected. They even thought of dropping the project. Later, as the water tower started rising, the confidence started building. For more than three months locals contributed their labour every evening

in the construction work. The municipality helped them with two PVC water tanks. After herculean efforts of three months, on 1st of Baisakh, 2061 BS, they inaugurated their community based water management system. At the beginning the system was serving 150 houses, which was later extended to 180 houses. They have established their own rules and regulations, regular meetings and continuous support from the community. With this effort each house is getting 250 to 300 litres of water every day.

The best part of the system is the serving of water at their door step, which otherwise would not serve the present changed lifestyle of the urban community. In Patan, there are several traditional dug wells following this model before Alkwo Hiti. They pump the water from well and convey through flexible pipes to the surrounding houses or store on a overhead tank to distribute later. Alkwo Hiti was the first of its kind to do it at *hiti* level with service coverage more than 150 houses. Each user has to pay initial fee and regular monthly fee which is within affordable range. Of several regulations one of the important regulations is to restrict construction of dug well in their premises. They are saving some fund after deducting management cost for their future expansion. Constructing two-hundred thousand litre tank and an overhead structure, they are planning to expand the service area to serve 1000 families.

Renovation of 2005

To win the confidence of the older generation, the committee looking after water management of Alkwo Hiti, promised to invest on renovation of Alkwo Hiti complex. In early 2005, they invested five hundred thousand rupees to maintain the inner channels, redo the compound walls, paving the upper platform, and protect the area from encroachment. A stone inscription has been installed on 24th February, 2005 after the completion of the renovation in full participation of local people.

The future planning

There is a huge demand for the water beyond the settlement. The discharge in Alkwo Hiti still capable of serving 300 households during dry season and about 900 households during wet season³⁰. Although these houses are beyond the Ikhachhen Tole, the committee is planning to distribute the water so that there will be more people served and simultaneously tied with Alkwo Hiti conservation. Alkwo Hiti leadership is very clear for their future activities. They believe that limiting themselves to conserving one particular *hiti* does not help conserving even their own *hiti*. With this philosophy they initiated the historical stone spout conservation committee.

Strengths and weaknesses

Giving an example of *hiti* conservation, Ikhachhen people are hailed for their success and innovativeness. This pioneering of the community-based *hiti* water management has

30. Taking 50 litres per day per capita and harvesting 12 hours of water. It is estimated that during two dry months the flow drops up to 1.67 l/s and during wet season it goes up to 5l/s. Flow during the driest winter was 2006 noted 1.62 l/s in 2006 and wet season highest was 6.67 in 2000.



encouraged several other *hities* to replicate the success. There are several of other *hities* in line. Konti Hiti has already started the construction, while *hities* like Sundhara, Nakhipot, Thapaa Hiti, Taapaa Hiti are in line. The biggest strength of Alkwo Hiti is the community unity and the leadership. The continuous threat to their *hiti*, perhaps must have kept them together based on which the dynamic leadership took the lead.

One of the foundation stones of Alkwo Hiti are the women of this neighbourhood. They are the happiest users of the water distribution system that has saved their time, effort and 'shame' of carrying water on their waist. However, the committee seems unaware to this fact. It is important to mainstreaming the gender issue in the management of water in Alkwo Hiti, and rest of other systems. Placing women in decision making position, involvement of them in water management, and raising their capacity to lead would provide the system a deep-rooted foundation.

One significant challenge to Alkwo Hiti system is the volunteerism. It is the voluntary sentiment and delight that has driven the movement thus far. As the organisation is getting mature, there is a need to replace present system that is guided by the social service sentiment by socio-economy based system. It is equally important to pay the cost of service in the urban environment. If the religious feeling was not sufficient during previous time and allocation of resources like *guthi* land was required, it will be even more required to compensate ones service in this commercialised society of 21st century. Similarly, it is high time to train new generation of leadership to manage the system for the continuity.

The other equally challenging aspect of water management is incorporation of the stake of all stakeholders of the urban society. Including Ikhachhen, most of the old settlements of Kathmandu Valley, and its periphery, are resided by urban poor, especially the poor renters. These people are unaware of the importance of the *hiti* culture and could be insensible to *hiti* regulations. It is very obvious that the rush of people during day and evening time in *hities* is overwhelmed by this population. There is a risk of not addressing the need of these stakeholders, not only in sharing the water resource, but also incorporating them in the cultural activities of *hiti* management. Therefore, this aspect needs to be addressed by the locals for further strengthening their position.

The Sundhara Case

Sundhara introduced

Sundhara, literally meaning golden spout is named after its spout wrapped with gold plated metal. Local people call it Nugā Hiti. Probably this is only the *hiti* which is not in depression. Locals remember that there were several steps to climb from the road to reach the spout³¹.

31. Sundhara being on the elevated location, a story was remembered by Mr. Kul Bahadur Chitrakar. When Saugā Hiti some 250m away from Sundhara, was inaugurated, a person from Sundhara teased them for constructing the *hiti* more than two storied deep to fetch water. He promised to bring water on building terrace. As he could please Phulchowki Mai, was blessed to have spout on above the ground.



The famous Sundhara without water. The gold plated metal was stolen from the left hiti this year

PLATE 28

After continuous laying of bituminous surface year after year it is already about half a meter below the road surface at present. Sundhara was established during Lichchhavi Period. One more spout known as Byancha Hiti was added to the complex by the daughter of famous Mall king Siddhinarsingha Malla in 1641 AD. Wrapping of the stone spout with gold plated metal was done later perhaps during Rana period only³².

Sundhara is one of the spouts charged by Nayekhyo Aquifer on the south. Some people believe that the actual name of Nayekhyo was Nag Khyo, meaning *naga* the serpent and *khyo* (or *khel* in Nepali) is open ground in Newari. The intake of Sincha Hiti and Sundhara are same. The underground chamber (*mangaa* in Newari) some 200 meters from the intake divides the flow between Sincha Hiti and Sundhara. A caution stone³³ is placed upstream to this *mangaa*. Additional some 700 meters of traditional water channel brings the water to Sundhara with another *mangaa* at Chhwasah. The ancient channel was made of burnt clay with brick lid on the top popularly known as *hitidun*.



Queuing for water from one of the beautiful hiti of Sundhara

PLATE 29

There are three spouts on the eastern main *hitigaa* while one single spout discharges on the western part of the hit complex. Drainage of the *hiti* was never a serious problem because of its elevated location. At present the drain is connected to municipal sewage line.

32. Based on the meeting with Prabhat Pariwar Club.

33. Caution stone suggesting not to open upstream to this point. Refer Plate. 8. and Foot note 25 for details.



For the management of the *hiti*, Sinya nicknamed Shrestha families of Sundhara were given the responsibility. Every year their *guthi* called Sinya Guthi need to go to Godavari Nau Dhara³⁴ and offer *puja* to Goddess Phulchowki by sacrificing a goat. At their return they need to visit the aquifer at Nayekhyo and once again take some ritual snacks and clean all the pots and plates there. However, the *guthi* has been dismissed and this ritual is no more performed by the Sinyas from several decades. Apart from the *guthi* rituals, the whole community is involved in cleaning the *hiti* complex. In earlier days people still remembers the tiring walk to clean *rajkulo* of Tikabhairav every year. They go in a crowd to clean even until to 1980s, however the interest was lessening after the construction of Ring Road which damaged the main channel bringing water to Lagankhel Pukhu.

Time line of Sundhara movement

People remember that during the time of Rana Prime Minister Juddha Samser (i.e. before 1900 AD), the burnt clay channel from the *mangaa* of Sincha Hiti to Chhwasah was replaced by cast iron pipe of 4" diameter. This shows that Sundhara required continuous maintenance in the previous time as well. This might be due to the channel with length of a kilometre that requires maintenance all the time, especially with the burnt clay channel.

This famous spout stopped discharging after the flood damaged the aquifer area in 1954. An attempt was made in 1981 to bring water from Naricha Aquifer with the initiation of local people and Nagar Panchayat during the Panchayat Rule in Nepal. Digging two infiltration wells at present District Education Office Complex, they tried to bring water in 4" HDPE pipe up to the *mangaa* at Chhwasah. Perhaps, due to insufficient head and improper levelling the attempt was not successful in bringing water to the spouts (Joshi, P. R. 1993 and Arnstroem, E. 1994). Thus Sundhara was left with nominal flow for some 39 years.



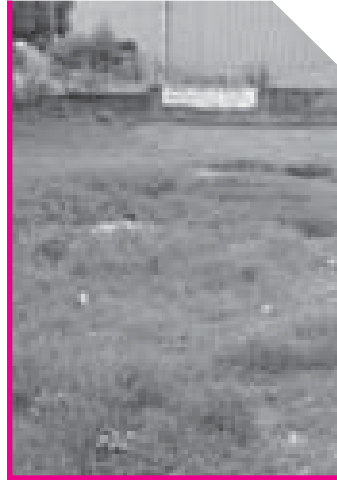
Meeting with Prabhat Pariwar on hiti issues

PLATE 30

34. There is a belief that the water in Sundhara is linked with Godawari and Phulchoki. This could not be explained as there is a depression and crossing of the flood plain of Kodku River in between. But the ritual shows the links to Godawari as Sinya Guthi has to perform annual *puja* at Godawari and Nayekhyo on the same day, linking the *hiti* sources.

The UDLE/GTZ initiative

In 1993 UDLE/GTZ helped to revive the *hiti* by improving the channel from Chhwasah *mangaa* to Nhyephā (next to famous temple of Mahaboudha). From Nhyephā a 4" HDPE pipe is brought up to the distribution chamber of the *hiti*. There was a proposal from UDLE/GTZ to establish night collection system so that the collected water during night time can be utilised. This proposal did not materialise at that time. After 1993, the perennial flow was disturbed from last four to five years, especially during dry seasons.



Nayekhyo
Aquifer: the
intake of
Sundhara

PLATE 32

There are three possible reasons for low discharge in Sundhara from last decade. The first is the construction of dug wells in Nayekhyo area. Part of the aquifer zone lies inside the Patan Industrial Estate (PIE). In the later period several water consuming industries were established in the industrial estate drawing enormous amount of 'free' water from the aquifer. Refer Annex D for the industries with dug wells in PIE. This has affected the flow of water to the spouts downstream. The second cause could be the habitation of the area between PIE and the old settlement. The agricultural land is all occupied by buildings restricting recharging of the ground water but drawing shallow water for their household use. Furthermore, destruction of Lagankhel Pukhu and *rajkulo* recharge system are yet other reasons for draw down of the ground water.



Bill board calling
for conservation of
Nayekhyo Aquifer

PLATE 32

The recent movement for source conservation

On this backdrop when people found that Sundhara spout almost dries up during office hours but maintains its discharge during mornings, evenings and nights; it was not difficult



to guess the culprit. When the locals faced severe scarcity of water from 2005, they were organised and led by Prabhat Parivar Club, a local community group, and initiated dialogue with PIE administration. This year they limited themselves in verbal request to not to pump extensive quantities of water affecting the flow of Sundhara. Under their request the PIE industries did not pump water, during the festival days of May 14, 15 and 16. Consequently, the *hities* started discharging. The lobbying of the Prabhat Pariwar Club brought the CDO to visit the site. As the monsoon returned, the problem was not that severe, the issue was not raised strongly.

The problem became even severer in 2006. This year the valley observed not a single rainy day for five winter months. The *hiti* dried even from February. A meeting was conducted with to solve the problem on 27 March 2006. Due to the public pressure a written agreement was made in the presence of CDO, mayor of Lalitpur Sub-metropolitan City, DDC representative, PIE, NWSC, and Prabhat Pariwar Club. PIE agreed to go for a deep boring to meet their water demand. For the time being the meeting agreed to allow the industries to pump water from their existing wells only during night hours of 11 pm to 3 am.

However, the industries did not abide by the understanding. When the request of Sundhara people were not heard by the industries, a mass of several hundred went inside PIE. They found that all the water tanks of the industries with several thousand litres capacity were full. The mass damaged the pump houses and buried five wells of textile and dyeing industries. This pressure brought the PIE to make written agreement to bury other dug wells as well. As expected, water started discharging from Sundhara after three hours of the event. It is important to note that this was the time there was a campaign going on through out Patan for the conservation of traditional *hities*. It was not only the residents of Sundhara that participated in the demonstration, but people from several neighbouring areas also showed their solidarity to this cause. The movement established the fact that the first right to water is for drinking, industries get only the second priority.

Early months of 2007 also observed the same problem of water missing in the spout during day time. The new manager in PIE took some time to understand the case. He tried to escape from the problem when the deep boring project was not successful as expected. The new leadership in PIE when challenged to prove PIE complex is the aquifer of Sundhara, local users became desperate. The locals raised the voices to evacuation of the industrial estate from their water source. Ultimately, CDO called a meeting on 26th April, 2007 which was participated by the municipality, Nepal Water Supply Corporation, District Water Supply Division, PIE and Prabhat Pariwar Club. The meeting was also attended by the representatives of eight ruling parties. PIE reported in the meeting that there are 40 wells dug in the complex, out of which 10 are already buried. The meeting took the decision to close all the wells within one month period.

Even today, with these commitments and initiatives, the problem is not solved. Prabhat Pariwar Club along with HSSCA are advocating for the cause of traditional water works conservation, taking Sundhara case as an indication towards success.

Other cases

The issue of Saptapatal Pukhu at Lagankhel

Saptapatal Pukhu is one of the several *Pukhus* at Lagankhel. This *pukhu* is linked with Lord Meen Nath, the second important chariot in the Matsyendranath Jatra. There are rituals that after three weeks of the completion of the Matsyendranath Jatra, people come to this *pukhu* on an auspicious day and release some fishes and sparrows to inform the two other worlds about the happening that the *jatra* was a success. This function was started during the reign of Lichchhavi king Balachandra Dev before Matsyendranath was brought to Kathmandu. Apart from this the *pukhu* is also used for offering *Samyek puja* by affluent Buddhists.

The public land around Ashok Thur³⁵ in Lagankhel includes ground and *Pukhus* covering 600 *ropanies* (~30 hectares) of land. Even recent cadastral maps show there was 205 *ropanies* of land. These *Pukhus* were charged by Tikabhairav *rajkulo* constructed during the reign of Lichchhavis more than 1500 years back. The *Pukhus* of Lagankhel is famous for charging local *hities* directly or indirectly through subsurface flows. Naricha and Nayekhyo aquifers are the nearest aquifer recharged by these *Pukhus*.

The encroachment of Lagankhel area started long time back. The army camp was the first encroachment while the electricity office, Sajha (the cooperative), Land Revenue Office, Judiciary, Patan Mental Hospital, Veterinary Clinic and Namuna Matsyendra School are the major encroachers. When Lagankhel ground was converted to major bus station of Lalitpur District; the commercial value of this area multiplied by several folds. Namuna Matsyendra School which occupied some land on the north of the Ashok Thur, engulfed surrounding areas. In the name of income generation, the school used its encroachments



Saptapatalpukhu from Ashok Thur in 1920
(Source: *Images of the Century*, GTZ, 1995)

PLATE 33

35. Ashok Thur at lagankhel, one of the four Thurs in Patan, is believed to be erected by Emperor Ashok from India when he visited this valley during his pilgrimage before Christian Era.





Panju, the Bajracharyas offering Hom before releasing the bird and the fish at Batuk Bhairav complex

PLATE 34



Releasing the birds and fishes. In the absence of the pond, fishes are released on the foundation of encroaching school building

PLATE 35



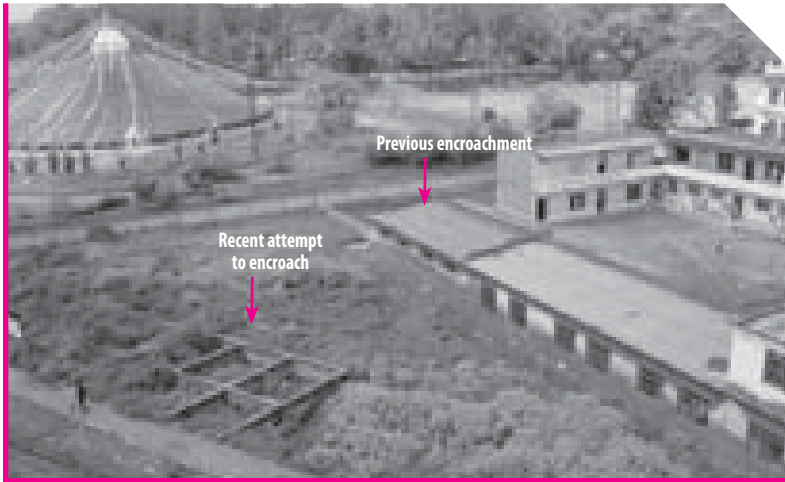
Saptapatal Pukhu next to Ashok Thur at Lagankhel in the 70s.

PLATE 36

for commercial purposes. The latest attempt of the school is to gulp already encroached Saptapatal Pukhu and construct a commercial complex.

Locals gathered against these wicked intension of the school. Under the banner of Lagankhel Environment Improvement Organisation, they filed a public litigation in the Supreme Court in 2004. After the trial of more than six months, the court gave a verdict to conserve the *pukhu* and ordered Land Revenue Department to rectify the land ownership certificate in favour of the public land and CDO to support the execution of the verdict.

It is interesting to note that even today after the Supreme Court decision of two and half years the land ownership certificate has not been rectified, instead, the school is pushing its construction slowly but gradually. Recently, the Historical Stone Spout and Source Conservation Association have joined hand with the Lagankhel Environment Improvement Committee to jointly mobilise the masses for the conservation of the *pukhu*. The first convention of HSSCA showed its solidarity to support the conservation movement.



Saptapatal Pukhu after encroachment by the school

PLATE 37



Public notice to protect Saptapatal Pukhu mentioning the Supreme Court verdict

PLATE 38

The Taapaa Hiti protest

Taapaa Hiti is one of the perennial *hities* of Patan famous for its discharge. Lying on the northern slope of the settlement, Taapaa Hiti is surrounded by Ikhachhen, Nayelakhu, Aki Bahal, Nyakha Chuka, Nyadhā neighbourhoods surrounding from east to south. The location of this *hiti* is the lowest level of the surrounding.

The date of establishment of the *hiti* is not known but the Lichchhavi time chaitya in the *hiti* complex describes its establishment not later than Lichchhavi Period (Theophile, E. and Joshi, P. R. 1992). People believe that the intake of Taapaa Hiti is some 500m aerial distance north of the *hiti* at Khwyebahi aquifer. There are two *hitigaas* adjacent to each other. The main *hitigaa* have three water spouts and the other *hitigaa* have two spouts. There must be two to three sources tapped to discharge through these spouts as per the observation of locals that the taste and colour of water is different from different spouts. The only discharging spout at present is the main spout channelling water from south. However, people from the area have not even moved a brick because of the belief of mishaps that could occur.

They faced water shortage from more than a decade. The scarcity became sever from last three years when NWSC rationed the water every third and now every fifth day. In 2000, people from Nyakha Chuka constructed a public well. It is said that when they failed in one location they dig the other one. Here they found a water aquifer with clean sand. At present they have community water supply pumping water from this well. Taapaa Hiti people believe that the well must be on the path of Taapaa Hiti source. Later people from other areas also started digging well or tube wells.

In early 2006 when Taapaa Hiti was almost dry, local youths complained the police and Archaeology Department to control illegal tapping of water in Aki Bahal, north to the *hiti*. Archaeology Department, requested CDO Office to intervene. When the office did not show enthusiasm to react, local youths went each and every house in Aki Bahal and destroyed



Taapaa Hiti, people remembers the flow more than double a decade back.

PLATE 39



Recently constructed public well at Nyakha Chuka believed to be on the path of Taapaa Hiti underground flow.

PLATE 40

around 15 tube wells. Soon after, the discharge increased in the spout. From then onwards an unseen rift is being created between the two neighbourhoods. At present, Taapaa Hiti people are planning to replicate Alkwo Hiti model incorporating Aki Bahal people.

The Chyusal Hiti protest

Chyusal Hiti is yet another historical *hiti* of Patan which is proud of having various idols from Lichchhavi Period. An stone inscription was found of around 450 years old mentioning major renovation of the complex at that time³⁶. The source of Chaysah Hiti is believed to be Kiri Keba area, some 200 m west of the *hiti*. The Kiri Keba aquifer east to Kumbheswor Temple are occupied by new houses in last two decades to house additional population. This *hiti* was serving surrounding neighbourhoods like Chikan Bahil, Ombahal, Kwyelachhi, Bhindyolachhi, Khapinchhen, Bholakhel, Sankhamool, Bhelachhen, Chochhen encompassing around 1200 houses.



Chyusal Hiti: the main spouts discharge only during monsoon season.

PLATE 41

36. Based on the information gathered from Mr. Kaji Babu Byanjankar.



There are two *guthies* for the management of this *hiti* viz. *guthi* of Tepye and *guthi* of Shakyas. One is responsible for the *hiti* complex while the other *guthi* is responsible for maintenance and *puja* of inner part of the *hiti*. Falgun Purnima, Panjaa Astami, Disi Chahre are some the important days for the *puja* based on lunar calendar. Recent major renovation was done around 1962. In 1986 with some financial support of municipality, the *hiti* was maintained. The regular cleaning and maintenance is done on Sithinakha. At present, Chyusal Tol Improvement Committee is taking charge of the management of the *hiti* from 1982.

Rana Prime Minister Chandra Samsheer installed two public taps after 1900. It is only about three decades; the personal taps became popular in this area. At present almost 80% houses have municipal connection but only 30% of them get water.

Municipal water supply is available every fifth day as in other parts of the city. Therefore, the *hiti* is the only option for majority of the people. People started digging private wells in this area from last decade. In last few years it mosroomed, especially in the Kiri Keba area. Kathmandu Valley faced severe dry winter early 2006. When Chyusal Hiti dried, youths of the area found that only that year more than 25 wells were constructed in Kiri Keba and Chikan Bahi area, the aquifer of the *hiti*. There were wells some 50 feet deep with full of water. The mob buried many of the wells and warned not to dig again. However, they believe that several of these wells are again opened. Chyusal Tole Improvement Committee is also initiating the aim of collecting off-time water.

The Thapaa Hiti case

This is one of the oldest *hities* in Patan charged from Naricha aquifer. The stone inscription in the *hiti* complex with Surya Dewal³⁷ describes that it is at least 900 years old. There are three main *hities* and one small *hiti* with metal spout. The later was installed by bifurcating the flow from the *jaroona*, which is no more in use. The intake of this *hiti* is located at Naricha some 50m downstream to Naricha Hiti. A wide post is erected above the intake to protect the intake. This *hiti* is serving around 250 houses of the neighbourhoods of Ubahal, Nau Don, Gaji Bahal, and Prayag Pukhu.

The burnt clay *hitidun* is replaced by cast iron pipe during the major renovation in 1962. After this renovation, aquatic life like frogs, snakes and fishes were lost. This year, people of Thapaa Hiti and Tangal Hiti approached to Archaeology Department for land acquisition of Naricha aquifer which could not happen in the absence of fund. Later influential people started building houses on the aquifer area.

After the construction of houses in Naricha area, the discharge reduced greatly. In 2006, locals found that some houses were running 'mini water supply system' by distributing water through their shallow well. There were 22 wells in 47 houses. The community requested to control the

37. This design of Surya (meaning sun) are installed only in three other *hities* i.e. Sundhara, Mangā Hiti, and Saugā Hiti as informed by Mr. Purna Man Shakyas of Thapaa Hiti.



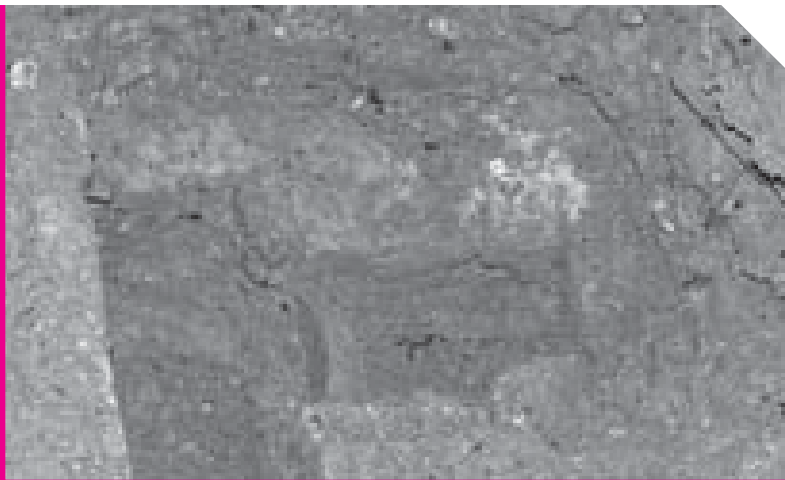
Thapaā Hiti

PLATE 42



The mangaa protected under this post at Naricha

PLATE 43



One of the drainage chambers opened for cleaning. The burnt clay athah is the chamber.

PLATE 44



pumping of water from the aquifer. This initiative helped them to improve the discharge in the *hiti*. The community is of the idea that there is an additional intake near cinema hall which can be harvested for this *hiti*. In 1989, NWSC initiated water harvesting from the *hiti* during night time. However, because of the poor management this system did not run for long. At present because of limited discharge, local people are not convinced to go for Alkwo Model.

Time and again this *hiti* has faced problems of drainage. In 1943 Rana rulers constructed a drain which drops in the drainage chamber of Saugā Hiti. Some 25 years ago the drain was reconstructed and connected to hume pipe laid by IDA project. Because of improper laying, the drain not only returned the flow back, but discharged waste water of other areas as well. At present this has been improved to much extent.

The *guthi* taking care of this *hiti* is already out of the memory of local people. Several attempts were made earlier to conserve the *hiti* by the community. At present the most active committee is Thapaa Hiti Lyamha Puchā (Thapaa Hiti Youth Group) which was established in 1999. Later the seniors were organized under Thapaa Hiti Conservation Committee. The committee is responsible for cleaning the *hiti* complex, regulating the use of *hiti*, and its maintenance.

The national movement of stone spout conservation

There are three forces of dissatisfaction emerged to create a critical mass in bringing the stone spout movement thus far. The first was the frustration of intellectuals and older generation of the society of the destruction of the national heritage: arts and artefacts of stone spouts and the culture related to it. The second was the slamming of religious norms and culture in the competition with unmanaged urbanisation. The third and perhaps the most strong force of dissatisfaction of the status quo is the thirst of the people. In recent years in Nepal, and all over the world, conservation of water is one of the major issues. The supply-side approaches of the 70s and 80s are being revised (?) to go for conservation.

Major renovation was conducted in several *hities* of Patan in the year 1961/62. It was not known what was the reason for this initiative, but the government at that time gave some fund to renovate several *hities*. The magistrate of Patan at that time mobilised the fund and people for this cause³⁸. Among several, the author was reported that Alkwo Hiti, Chyasal Hiti, Thapaa Hiti, Saugā Hiti, Taapaa Hiti, Elahne Hiti were renovated. Some 15 years back Lions Club of Patan initiated *hiti* renovation works, however in sporadic way. Lalitpur Heritage Conservation Group later initiated renovation of some *hities* about a decade back. Similar initiatives were taken time and again for the conservation of *hiti* where individuals like Er. Narayan Govenda Halwai were involved.

38. Based on the conversation with Mr. Kil Bahadur Shrestha, Alkwo Hiti. One can observe English letter M in those renovations representing King Mahendra or the materials used which is lime-surkhy, typical material before introduction of cement in those days. This was the time the autocratic Panchayat System was introduced in Nepal by the same king.



Women were in majority in the rally.

PLATE 45

NGO Forum for Urban Water and Sanitation (NGOFUWS) and its members are one of the pioneers in advocating these issues including conservation of traditional sources. When municipal water supply failed to serve people, they started exploiting ground water unabated in urban centres of Kathmandu Valley. The Alkwo Hiti case, Sundhara case, Chyusal Hiti, Thapaa Hiti and Taapaa Hiti cases, the case of Saptapatal Pukhu of Lagankhel and many more are the manifestation of these in-fights of our society where the government was not in favour of the larger mass, knowingly or unknowingly. Perhaps, they lost their capacity in competing with the market forces of urban areas where the land or water resource have opportunity cost as well. Therefore, present movement to conserve traditional water spout has become primarily the issue of governance.

After their initial success in distributing water in Ikhachhen neighbourhood, there was huge pressure to Alkwo Hiti to expand the area. Other *hiti* organisations were also excited by the success of Alkwo model. Alkwo Hiti and representatives of other *hities* have realised that conservation of one *hiti* or water source is not possible leaving the others in vain.



Displaying their concern in the rally.

PLATE 46



Establishment of HSSCA

While monitoring the multi million dollar project of Melamchi Water Supply for Kathmandu Valley, NGOFUWS launched water conservation campaign in parallel. Rain water harvesting, household level water conservation, value-based water education, are some of the areas the forum was focussing. When the initiative of Alkwo Hiti was known, NGOFUWS lead a promotion of such people-based water conservation projects using media and other tools. Frustrated by the water scarcity, attracted by NGOFUWS water conservation initiatives and stimulated by the success of Alkwo Hiti, a round table meeting took place at Ikhachhen on 25th March 2006 among the local clubs and organisations related to *hiti* management. This meeting agreed to establish Historical Stone Spouts and Source Conservation Association (HSSCA) and formed nine-membered ad hoc committee. After two months, the committee hosted a convention of *hities* and formally organised into HSSCA on 20 May, 2006 under the chairmanship of Mr. Sushil Shrestha from Alkwo Hiti. List of members are presented in Annex A.

HSSCA launched first demonstration to call the people to join the conservation movement on 27th May, 2006. All the associations of local *hities* took part in the demonstration for conservation of traditional water sources. The situation has ripened this year. On 16 June, 2007 second rally was organised by HSSCA in association with LSMC, NGOFUWS, Rrotract Club of Patan Durban Square. 25 organisations, 31 tole improvement committees and 77 women groups took part in the rally calling for the conservation of traditional water sources.

The first national convention

The *hiti* conservation initiatives of Patan also triggered similar acts to other cities of the valley. NGOFORUM played important role to cross pollinate it to other cities of Kathmandu



The first convention on *hiti* management.

PLATE 47

Valley. Young students and activists of several organisations of youths, Red Cross, Jaycees, and NGOs including municipal staff were mobilised to raise the local issues of *hities* in these four cities. For the national convention, all the cities organised city-level workshop to raise their issues. All these findings were brought to the common forum under the banner of national convention of stone spouts on 18th June, 2007. Participated by national personalities, the convention ended with a declaration to work together at non-governmental as well as governmental levels. The text of declaration is presented in Annex B. Apart from other issues, as a token of joint effort, the convention declared to voice the cause of Saptapatal Pukhu and Sundhara case.

Replication of Alkwo Hiti Model

One of the major achievements so far may be taken as the awareness of the people of Patan to go for *hiti* conservation. With the initiation of HSSCA, NGOFUWS and Lalitpur Sub-metropolitan City, several *hities* are in line to replicate the example of Alkwo Hiti model. The *hities* trying to follow the Alkwo Hiti example are:

- Kwonti Hiti – under construction with the support of UN ESCAP.
- Elahne Hiti – the conservation work is underway with the support of USAID.
- Sundhara
- Taapaa Hiti
- Amrit Hiti





Water Movement in Patan with reference to traditional stone spouts

THE CHALLENGES

The technical challenges

One of the first questions raised in every discourse of traditional *hities* is the ‘proof’ of aquifer that is serving particular *hiti* or groups of *hities*. These issues are raised with several intentions, sometimes to find excuse for encroaching the aquifer and the path of ground water flow. And, there are also good reasons to explore these aspects as to conserve the area both to recharge the water and control the activities affecting quantity as well as quality of water. UDLE, in its studies of Patan Conservation and Development Programme, conducted several studies on various aspects of ground water in Patan related to *hities* in 1992/93 (Joshi, P. R. 1993). These studies are a good basis for the further exploration of the issues. A clear demarcation of all the aquifers, large and small are crucial for the conservation of traditional water works.

It is already been very late to address the conservation of the aquifers as the urban expansion has already gulped the areas for several purposes. It is reported that not only building houses on these aquifers, they are extracting ground water indiscriminately from these aquifers. It is not only the demarcation of the aquifers, but the flow path to stone spouts is equally important. Mapping the channels linking the aquifers to *hities*, locating the *mangaa*, and conserving the outlets are the preconditions for scientific and sustainable management of traditional *hities*. This is more urgent in the case of drying out *hities* like Subaha Hiti, Kani Baha Hiti, or Tyagā Hiti, for example. The issue of Alkwo Hiti incident, the Sundhara aquifer case of PIE, the Taapaa Hiti case, the Chyasal Hiti case, the Thapaa Hiti and Sundhara channels and many more are demanding some scientific studies in the area. Equally challenging are the technologies used by the then engineers which are ‘maintenance free’ even for centuries. Scientific studies are required to discover the technologies used to filter the water and maintaining the flow path.

Pukhus are yet another equally important segment of the whole system. Exploring the possibilities of reviving the *rajkuloes*, alternative water ponding possibilities like rain water harvesting, recycling of water, etc. are other areas of technical interventions. Observing the topography, it is clear that the recharge zone of the aquifers of Patan is the southern tar lands like Thecho, Sunakothi, and Chapagaon. Since these areas are encroached for housing in very fast pace, recharging the aquifer would be another challenge in the days to come. Therefore, recharging the ground with rain water is very crucial for the sustainability of *hiti* systems in Patan in a long run.

Recommendations

Several activities are proposed for future interventions to further explore the technical aspects of *hities*. This includes

- Study of traditional water conveyance and filtration systems
- Technical alternatives to *hiti* water distribution to meet present life style.
- Regular monitoring of discharge and quality of water.
- Replication of Alkwo model in potential *hities*.
- Study of technical problems associated with drying out *hities*.
- Study of aquifers, their boundaries, conservation, and recharge potentials.
- Mapping and documentation of *hities*: their intake systems and drainage systems both in maps and physical demarcation at site.
- Study of *Pukhus*: the recharging function of *Pukhus*, possibilities of harvesting of rain to feed through these *Pukhus* to the aquifers.

The legal challenges

Nepal is urbanising in very fast pace. However, the social and legal structure is not keeping the pace with it. Even today, our land types are categorised based on agricultural productivity norms. Therefore, the cadastral survey and land management departments do not recognise various urban land uses. In the absence of such classification, with the given advancement in building technologies; every land can be used for all purposes. Therefore, urban land categorisation could be a milestone in urban management including the water works.

The complete system of water works of traditional *hities* are of public interest mainly from two aspects, viz., the drinking water; and conservation of heritage and civilisation. The Interim Constitution of Nepal (2007) has categorically supported the right to conserve and promote civilisation, culture, heritage including others³⁹. The more than 1500 years old water supply system undoubtedly lies under the scope of this constitutional provision.

39. Ineterim Constitution of Nepal 2063 (including 2064 amendments) (in Nepali) under Section 3.17.3 Civil right provision states that all the communities residing in Nepal would have right to protect and conserve their language, script, culture, civilisation and heritage.

In the case of water use and water rights, several acts are promulgated in recent past. Most of these acts are limited to irrigation, hydro power and applicable to surface water sources. There is a need of acts addressing ground water use. In case of traditional *hities* and its complete systems, as discussed in previous chapters, there are several aspects of the system that need to be protected. They are:

- the ownership of the complete system to the users and the state as public goods and services,
- the control of unauthorised extraction of ground water at the source, flow path and at spout,
- the protection of intake, *mangaa*, the water channels, the *hiti* complex, and drainage as public goods and historical and archaeological objects,
- the protection of water bodies from point and non-point pollution sources, and
- the damage made by private or public intervention for other purposes at the source, flow path and, at spout level

Of the several prevailing acts, most of the issues are addressed by Water Resource Act (1992) and subsequent regulations, Essential Commodities Protection Act (1955), Ancient Monument Protection Act (1956), and Environment Protection Act (1996). Moreover, the Local Self Governance Act (1999) has categorically given the responsibility to protect and develop *hities* to the respective municipalities. The Supreme Court decision against Namuna Matsyendra School in the case of Saptapatal Pukhu was based on the religious, archaeological and cultural importance⁴⁰. Similar decision was made by the Supreme Court in the case of Ichangu water dispute⁴¹ of local people and water vendors in Kathmandu. The decision of the court was in favour of the local people that they have the first right to water against the vendors.

The Ichangu case could be precedence in the case of Sundhara source protection in PIE. However, these cases do not answer the issues of extracting ground water by the houses at the source or in the flow path for their household purposes. Does the land ownership also gives right to ground water beneath it or not? Does the land title allows constructing house and infrastructure that damage or restricts the natural flow of ground water? If proven that the construction of infrastructures in recent past, be it private or public; that is damaging/ hampering the water system, can it be corrected or removed by the person or institution doing so? To address these issues, a clear legislation addressing ground water issues including drinking purpose is of dare need. However while preparing such legal tools; the social organisations should use their political strengths to safeguard these historical and public systems. Two major provisions may be used for such purposes for the time being. That are the provision of Water Resource Act (1992) that declares the ownership of water found within the Kingdom of Nepal is vested in the state (WAN, 2005). The second provision of the same act that helps to protect the system is the priority of water use is given to drinking

40. Based on the decision made by the Supreme Court on 2005.02.18 made available by Mr. Purna Sthapit, Chairperson of Lagankhel Environment Improvement Committee.

41. The decision of Supreme Court on 2005.06.13 against the water vendors made a decision that the primary water right is with the people. One may extract ground water for household purposes, but sale of water will get secondary priority. Based on conversation with Mr. Gyan Bahadur Karki, Chairperson, Paanch Dhara Mool Sangharsha Samiti.



water and domestic use (WAN, 2005). The third basis, in case of traditional *hities*, can be drawn from the Ancient Monument Protection Act (1956) where these centuries old system should be registered as national monument and heritage. Moreover, Environment Protection Act (1996) also provides room for declaring *hiti* systems as National Heritage⁴².

One of the significant provisions in Water Resource Act (1992) and its subsequent regulations of 1998 is the provision of Drinking Water Users' Association. Registering such organisation to manage water of each *hiti* will provide legal base to *hiti* conservation and its source protection besides its equitable use.

Recommendations

There are several acts and regulations that support the conservation and operation of traditional *hiti* systems. While utilising the existing provisions, one important aspects of conservation of the water works is the first right to the aquifer to public use than private use. Therefore, groundwater legislation may be required to address specific issues of ground water management, its sharing among the stakeholders, and save the resource from the syndrome of 'tragedy of the commons'.

Declaring traditional water works (from source to sink) as a national heritage could help to conserve the systems where users along with municipality, environment ministry and archaeology department need to sit together.

The social challenges

The caste system, and the societal role based on the caste system has already changed. In the changed context, the 'upper class' and 'lower class' norms are fading out. However, the differences between haves and have nots have not differed. Those who could invest are digging private wells, pumping water and relieved their burden even by paying tanker service. Therefore, there is a rift between those who need to rely on *hities* and those who can escape from the *hities*. This is true not only with differences in economic capabilities, but also the fortunate in having reachable ground water in their land. The cases of Chyasal Hiti, Taapaa Hiti and Konti Hiti are some of the examples of these. Therefore, the challenge is how to bring all the members of the society in unity to address sustainable *hiti* management.

Drastic changes can be observed in the urban composition of historic core settlements of Kathmandu Valley in recent days. There is in-migration and out- migration taking place in parallel. Either because of sub division of parental properties, or inconvenience to meet

42. EPA 1996 Clause 9 has provision to declare national heritage. By enlisting the site and publishing in the gazette National heritage may be declared by the government.

changed life style, many people are migrating out of the old houses of the city core of Patan. On the other hand, these houses are occupied by migrating people from other parts of the country, particularly urban poor. They have migrated to these places because of cheaper rent, nearness to their workplace, and/or easy access to public facilities including *hities*.

Migration of people from other culture obviously builds differences and conflicts. It is obvious that when an alien goes to a *hiti* and becomes ignorant to the norms of *hiti* utilisation that the locals were practising from centuries, rifts emerges. When their numbers is overwhelmed, conflicts start taking shape. This is the case in most of the *hities* now a days. Therefore, it is important to include the new comers in the system and patiently train them with the common norms that they are practicing from centuries.

One more social issues need to be discussed here. Washing clothes, fetching water and cooking are the customary job of the women from earlier time. Present urbanisation is heading towards nuclear families, with both the male and female partners are working. In the changed context, it is not only affordable to bring water from *hities* (with respect to time and efforts), the sharing can be 'shameful' and difficult in the still male dominated society.

Therefore, maintaining the *hities* to discharge adequate water is only part of the solution. Distributing at the door steps is equally important for the sustainability of the system. This is one of the most appreciable aspects of Alkwo Hiti model.

It is not only the increase of the population that is demanding more water, but the change in life style is also demanding more water. One of the social challenges is to make people aware of the limitation of the resources and optimise available water sources. The Alkwo model has started collecting water for five hours from 6 to 11 pm in the evening. There is a plan to collect another several hours to expand the service. Two social risks that need to be considered while expanding additional hours of water harvesting. The first is the right of the poor to use this public facility. The second equally important issue is the historical value and urban landscape of the *hiti* complex in the neighbourhood. A *hiti* without water is nothing better than a temple without god. The dried Sundhara of Kathmandu does not symbolise water to the passer by. Therefore, whether harvesting water for household delivery or for public use, diversion of water before the spout should not be allowed. If this is allowed, one will not have argument against any attempt to extract water from the intake or even from aquifer itself.

One more sharing needs to be discussed here. It is not only sharing of water, it is also the sharing of the space that needs to be



Embankment of Nhu Pukhu encroached for market. From three sides.

PLATE 47





The vegetable market on the embankment of Nhu Pukhu: there is a competition for the ownership of this space between local club and the municipality

PLATE 48

addressed. Space has become equally limited resource that should be shared by the public. The *hiti* complex and its surrounding, the *pukhu* complex and its surrounding; and the aquifer areas and its surrounding should be considered as public resources. Therefore, their use for other than water management purposes can be labelled as inappropriate use. The case of Nhu Pukhu in Lagankhel, where the surrounding of the *pukhu* is lost in the contest with market forces to have shops and sheds. Tomorrow when these spaces become even attractive to have multi-storeyed buildings, do we allow such buildings encroaching skyline and the basement? This is another equally challenging social question we need to answer now itself.

Recommendations

Two major recommendations may be drawn from social point of view. The attempts of management work should gear towards harmonising the new comers towards *hiti* management. Purposeful initiation of main streaming women in the process of decision making and management of *hities* should be initiated

The most challenging part is the encroachment of *Pukhus* and *hiti* areas for other purposes, be it public use like schools or government offices; or private use. There are even trend of renting these spaces by community groups with one or other excuses. Therefore, public awareness in keeping the public space intact for openness, public functions and enjoying water works should be initiated by the municipality and local user groups.

Awareness building programmes for schools and technical education centres should be targeted. Municipal as well as community level leaders should be made aware of the general concept of *hities* and its complete system.

The management challenges

Lichchhavi and Malla period management systems were emerged and refined with time. They have divided the two tiers of water management so wisely that people even enjoyed managing water. However, there were two major lackings in the traditional water management, viz. the cover of religion and beliefs were made so thick in the course of time that they forgot the real cause; and the transfer of technology and documentation of the efforts were made so holy that everybody understood as the godly deeds and forgot the skills; and consequently lost the technologies.

Urbanisation (in the recent form) is the most powerful force that is destroying the old socio-economic base, and thus the social practices. The urban management backed by rituals, religions and beliefs are no more appropriate with the same colour and outfits. Perhaps, instead of fear pride might be appealing to many; and instead of benefit in 'next life' admiration in this life may be persuasive to others.

The single-most cause of destruction of traditional management system is the erroneous policy of the government to centralised management of the *guthi* system under Nepal Guthi Corporation. This centralised system coupled with imprudent policy of replacing trust land by cash, has destroyed the *guthi* and subsequently the whole management system that could survive more than a millennium. This opportunity of breaking down the *guthies* not only raised greed of people to grabbing the trust land, but also evoked them to hide other important information, knowledge and wisdom which otherwise would have been shared with the new generation. The Sinya Guthi of Sundhara lost when the land was shared among the *guthi* members; the *guthi* of Bajracharyas of Alkwo Hiti were reluctant to share the information that they have; the *guthies* of many *hities* are even out of the memory of people of this generation. In such context, trying the same old tool may not help to address present demand of *hiti* management. The reviving of Sundhara even in the absence of Sinya Guthi is an example.

It is very difficult to compete with the market forces in the country like Nepal with limited land resources. The outskirts of previous time like Lagankhel and Jywalakhel are the new centres of the expanded town. The so called school at Lagankhel⁴³ or the Patan Industrial Estate, the forces are commercial. In the first case it is the land resource and in the second one it is the raw material for the industries in the form of water resource. Moreover, encroachment of *pukhu* by Trade and Export Promotion Centre like in Poda Pukhu or uncontrolled wells in all the aquifers, the market forces are so strong that the approach of local people is too short and too weak. Therefore, the challenge is how to enhance their capacity and how to make them politically stronger than the market forces.

The city level management of the water works was tarnished slowly and gradually also because of the unwise participation of the state. There were issues emerged of allocating

43. Although it is said that the encroachment in Sapta Patal Pukhu is to expand the school, the reality is to construct a business complex to utilize the strategic location of the pukhu next to Lagankhel Bus Park.



inadequate fund for building the chariot or similar activities in the case of Rato Matsyendranath Jatra. The role of people and the community was minimised in last several decades. It is annoying to note that instead of calling people to takeover the responsibilities once one group of people were incapable of fulfilling their duties; the government used police and army to pull the chariot or fulfil similar processes and activities. The caste system has collapsed (at least in the form of profession). After sometimes Matsyendranath Jatra will be suffering from the absence of *Panjus* as their new generation will be 'delighted' to flee to the west. These examples have raised two aspects of the management: the direct intervention of the state does not help nor the group (or caste) ownership of the past can be continued in present form. The failure of NWSC managing water is yet another example of central management system.

One of the foundation stones of management is the feeling of belongingness of the system. The ownership feeling can be drawn from the dependency of the users to it. Therefore, serving the population is a key to the sustainability of the system. Serving the water at the door step is the strength of Alkwo Hiti model which not only attracted people to invest in the system but also established ownership feeling. There can not be better examples of ownership than burying their private wells to get the *hiti* water by the individuals of Ikhachhen. The same technique is proposed by Taapaa Hiti Improvement Committee. They are planning to distribute water with priority to the areas where private ground water extraction was found. However, a question arises that if the supply of municipal water is made sufficient, what will be the faith of these *hities*? As Melamchi is still a dream at least for not less than a decade, there is still time for that. There are management models under consideration in Melamchi Water Supply Project (and even for electricity management) that the local level management is proposed to be devolved to the communities at neighbourhood level to gain efficiency and controlling pilferage. If this happens, the same community team can manage both the waters and bring best out of it.

Alkwo Hiti model, as discussed above, has a risk as it is based on volunteerism. The management committee and even the regular staff of the management team are volunteers (or paid nominal). This is not possible in long run. Therefore, it is proposed that private service provider (be it a person or group of people) must be serving under democratic community leadership. Drinking Water Users' Association to manage community water could be a legal basis for the authorised water management body for a *hiti*.

In 2004 when Saptapatal Pukhu case was filed in the court, people from Mangā Hiti or Thapaa Hiti (for example) read the news, but they were not prompted to support the movement of Lagankhel Environment Improvement Organisation. This could be both, because of ignorance that how important that *pukhu* is for these *hities*, and also because people are confined to their immediate periphery. However, the recent initiative of HSSCA is commendable. They, not only organised themselves, but wisely invited organisations involved in *pukhu* conservation to join the team. Perhaps, rituals and festivals may not be required to address these issues in 21st Century. Nonetheless, making most out of the

sentimental values of the people; which is defended by scientific knowledge that we have gathered so far, would help to fight the commercially strong market forces. For this purpose it is significant to bring state authorities like municipality, archaeology department, environment department, district administration and many more on board who are responsible for the maintenance, protection and management of such historic and public utilities. The leadership, however, is required to be taken by among the users of the *hities* and its system⁴⁴.

Furthermore, recognising the strong bond of people to the festivals like Rato Matsyendranath Jatra, HSSCA or the municipality can utilise the opportunity to educate the locals. *Hiti* management and *pukhu* conservation activities may be harmonised with the festival. For example, promoting the fish releasing ritual of Saptapatal Pukhu through media and bringing people to this auspicious activities or maintenance of *pukhu* or *hities* to welcome the ratha of Matsyendranath could bring communities together in the conservation works.

Recommendations

***Hiti* management committee need to take the charge of local level management. Neighbourhood organisations like tole improvement committee or local club, or other forms of local organisations may be encouraged to take lead in such management. Municipality and ward offices should be playing facilitating role in the process. In *hities* where such organisations do not exist or are relatively weak, external supports may be provided to raise awareness, build their capacity to recognise the need and community mobilisation. Mobilisation and substantial involvement of women need to be prioritised.**

Since water works management is a service delivery system; corporate approach need to taken for the management. As it was pointed out in the case of Alkwo Hiti, these institutions may require external support to enhance their managerial capacity, the skills of organisational management, nurtured by proper democratic institutional norms. These institutions may require technical and other supports from external agencies or from the local authorities.

In case of city level management, the municipality should be shouldering with HSSCA. Broader representation of other stakeholders, both from civil society and government organisations is important for the effective role of the organisation. Formal participation of *pukhu* committees is also important in the HSSCA. Present HSSCA need to be strengthened from this aspect.

44. It is important to mention here that the urbanization forces have enlarged the municipal boundaries both in aerial as well as social sides. The Patan indigenous population could be already in minority when considered the whole municipality. Therefore, it is important to categorically mention that the leadership of the management should be taken by the downstream users of the water works so that proper representation is made for the sustainability.



Roles and responsibilities of key stakeholders

The narratives above have elaborated much of the roles of various stakeholders in the courses of water movements in Patan. The recommendations are underpinned by roles of various stakeholders. Putting it in more explicit terms there are five groups of stakeholders in managing stone spouts.

- Users, the community groups
- Municipality
- Government agencies
 - Department of Archaeology
 - Ministry of Environment, Science and Technology
 - District Administrators Office
 - Divisional Office of Water Supply and Sewerage
- Non-governmental organisations including researchers
- Donors and International Conservation Organisations

As the local owners of the *hities*, users have the primary role in the conservation and management of the system. With the establishment of HSSCA, the community groups have already established their position not limiting to particular *hiti*, but a city level mechanism with the strength of advocacy. Municipalities will have three roles. While providing financial as well as other supports, they should be responsible for conservation of the spouts by playing supervisory role. Moreover, they should be the link between concern governmental agencies and donor communities as well. Here, the municipality should play the coordinating role.

Roles of various governmental agencies listed above, and many others would be at policy level and will be based on sectoral expertise. For example, the archaeological department would be more concerned with its historical and archaeological values but environmental agencies are concerned on the conservation issues. The education office may play a vital role in awareness building and research activities while water supply office should try to incorporate the issues through their policy interventions.

NGOs should play a facilitating role in the whole process. This may include capacity building of various stakeholders including the community groups, municipalities, and the government agencies. Advocacy of the issues, technical backup and linking the donors and the users are important roles of NGOs. Apart from supporting municipalities through its expertise, NGOs can use its strength or bring the research partners for the research and development of the *hiti* system.

Resource is one of the major limitations in the conservation and utilisation of *hiti* water. Donor agencies including UN-HABITAT, UNESCO, INGOs have supportive role to play in conserving and managing these resources for the welfare of locals and needy people. Promoting these time proven technologies and management systems as best practices in the international arena is yet another responsibility of this group.

CONCLUSIONS: THE PATH AHEAD

The fascinating water works of Patan, and rest of Kathmandu Valley; are exemplary works of previous centuries which survived and serving even today. However, the technical knowledge as well as management skills was not continued, thereby bringing the system to the verge of extinct in competition with irresistible urban pressure in the valley. While this book is being written, 12 *hities* of Bhaktapur are at the brink of collapse due to the widening of a road. Therefore, it is of paramount importance to address the issues of traditional water works conservation while meeting the water requirement of the locals.

Recent trend of forming hiti management committees is the replacement of lost (or about to loose) *guthi* system by local level management system. At city level, establishment of Historical Stone Spouts and Source Conservation Association, HSSCA in Patan shows an encouraging trend in conservation of these time proven systems. Since this is the case of resource sharing: sharing of the water resource – the sharing of aquifer or the discharge of the *hities*; sharing of the *Pukhus*, and its recharge systems; these are the issues of governance. Hence these are the political issues. Therefore, involvement of political institutions, be it municipality or district administration of the government; their roles are equally vital. Local level management by local users' groups and city level management by city level community institution (like HSSCA) in collaboration with other public institutions like municipalities, and respective government organisations can create a synergy.

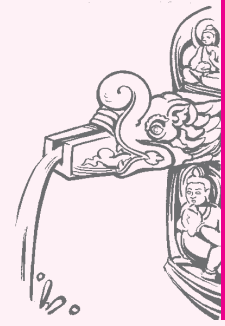
The most important activities for the sustainability of these water works would be bringing awareness of the people, enhance the hiti systems to meet local water needs (partially if not completely), and conserving *Pukhus* and aquifers that helps to maintain the system. Investments are required in establishing water distribution systems, installation of

management systems in each hiti committees at local level and strengthening of HSSCA and respective government institutions. Promotion of meaningful involvement of women, both in decision making and management is crucial for the sustainability of the system.

Technical studies of the system and further researches, documentation of historical and existing facts and figures, mapping of the systems are required. Rain water recharging to the *Pukhus* and aquifers is yet another areas requiring applied research. Transfer of these lessons to new generation through education institutions like schools and colleges are equally important for the sustainability.

Besides others, two major legal recommendations can be made; i.e. establishment of first right to public in using underground water resources (like aquifer) against private use, even if it is household water use. The second legal provision would be enlisting the hiti systems (from source to sink) as national heritage.

At last, *hities* can not be alive if there is absence of flowing water; therefore, conservation is a must. The second social dimension is improving the system to cater present lifestyle, while sharing the resource through out the cross section of the society including the poor renters who are most dependent on this natural gift. Joint efforts of CBOs, NGOs, and the governmental authorities including municipalities can bring faith to this pride of our ancestors and hope of our future.



REFERENCES

1. Arnstroem, E. KV (1994) *Water Supply in Lalitpur, Nepal- Case Study: Storage and Redistribution of Water from Hities (stone spouts) in a small, urban area*. Master Thesis, Lulea University of Technology (unpublished).
2. Becker-ritterspach R. O. A. (1994) *Water Conduits in the Kathmandu Valley*; Munshiram Manoharlal Publishers Pvt. Ltd. New Delhi.
3. Dixit, A. and Upadhya M. (2005) *Augmenting Ground Water in Kathmandu Valley: Challenges and Possibilities*; Nepal Water Conservation Foundation, Kathmandu. (internet publication)
4. HMGN, (1996) *Environment Protection Act 1996*, in Collection of Acts, Pairavi Prakashan, Kathmandu.
5. HMGN, (1997) *Environment Protection Regulations 1997*, Ministry of Population and Environment, Kathmandu.
6. HMGN, (1955) *Essential Goods Protection Act 1955*, in Collection of Acts, Pairavi Prakashan, Kathmandu.
7. HMGN, (1956) *Ancient Monuments Protection Act 1956*, in Collection of Acts, Pairavi Prakashan, Kathmandu.
8. Joshi, P. R. (1993) *Feasibility Study of Rajkulo: Rehabilitation of Patan's Traditional Water Supply Network*; Final Report; Patan Conservation and Development Programme, UDLE/GTZ, (unpublished report).
9. Interim Constitution of Nepal (2007), Himali Prakashan, Kathmandu.
10. Locke, J. K. (1980) *Karunamaya*, Sahayogi Prakashan, Kathmandu.
11. NGOFUWS (2006), *Traditional Stone Spouts Enumeration, Mapping & Water Quality*, NGO Forum for Urban Water and Sanitation, (unpublished report).
12. NWSC Lalitpur Branch (2007), *Introduction to Water Supply Problems and Alternative Solutions*, Internal report of Lalitpur Branch, (unpublished).
13. Pradhan, R. *Dhunge Dhara: A Case Study of the Three Cities of Kathmandu Valley*, In Ancient Nepal, Journal.



14. Theophile, E. And Joshi, P. R. (1992) *Historical Hiti and Pokhari: Traditional Solutions to Water Scarcity in Patan*; Patan Conservation and Development Programme, UDLE/ GTZ, (unpublished report).
15. Tiwari, S R (2001), in *City Diagnostic Report for City Development Strategy of Kathmandu Metropolitan City*, Kathmandu Metropolitan City / World Bank, Kathmandu.
16. Tiwari, S. R. (2002) *The Brick and the Bull: An account of Handigaun, the ancient capital of Nepal*; Himal Books, Lalitpur.
17. Tiwari, S R, (2002) *Transforming Patan's Cultural Heritage into Sustainable Future: Case Studies of the Past and the Present*, (unpublished).
18. WAN (2005) *Water Laws in Nepal*; Water Aid Nepal Shanta Bhawan, Lalitpur.

IMPORTANT EVENTS OF HISTORICAL STONE SPOUTS AND SOURCE CONSERVATION ASSOCIATION (HSSCA)



1. Ad-hoc Committee Formation: 25 March 2006

1. Co coordinator	Mr. Sushil Shrestha
2. Member	Mr. Kullal Dangol
3. Member	Mr. Purna Man Shakya
4. Member	Mr. Shree Gopal Maharjan
5. Member	Mr. Gopal Bahadur Shrestha
6. Member	Mr. Narayan Hari Maharjan
7. Member	Mr. Aroj Khadgi
8. Member	Mr. Dilip Joshi
9. Member	Mr. Manoj Chipalu

2. Formation of Historical Stone Spouts and Source Conservation Association : 20 May 2006

This first convention of organisations related to stone spouts took place at Alkwo Hiti Chapah. The organization was given the name as *Historical Stone Spouts and Source Conservation Association* (ऐतिहासिक ढुङ्गेधारा तथा मुहान संरक्षण संघ). Similarly, The ad hoc committee was deformed and then nominated the new nine members committee from the floor. The executive committee was formed over the working period for 3 (three) years. The elected committee members

1. President	Mr. Sushil Shrestha
2. Vice President	Mr. Manoj Chipalu
3. Secretary	Mr. Dilip Joshi
4. Jt. Secretary	Mr. Narayan Hari Maharjan
5. Treasurer	Mr. Shree Gopal Maharjan
6. Jt. Treasurer	Mr. Tirtha Raj Bajracharya
7. Member	Mr. Tulsi Prasad Sigdel
8. Member	Mr. Bhai Raja Shrestha
9. Member	Mr. Raju Byanjankar



Participating hiti or neighbourhood improvement committees in HSSCA

1. Alkwo Hiti Improvement Committee
2. Bhindyo Lachhi Tole Improvement Committee
3. Chhay Bahal Tole Improvement Committee
4. Chyasal Tole Improvement Committee
5. Hiku Hiti Improvement Committee
6. Iku Hiti Improvement Committee
7. Imukhyo Tole Improvement Committee
8. Kanibaha Tole Improvement Committee
9. Kumbheswor Tole Improvement Committee
10. Makā Hiti Improvement Committee
11. Mangā Hiti Improvement Committee
12. Naa Hiti Improvement Committee
13. Nagbahal Tole Improvement Committee
14. Nakhipot Tole Improvement Committee
15. Naricha Hiti Improvement Committee
16. Prabhat Parivar Club
17. Puchwo Tole Improvement Committee
18. Saithu Ganesh Hiti Improvement Committee
19. Saugal Tole Improvement Committee
20. Sincha Hiti Improvement Committee
21. Subahal Tole Improvement Committee
22. Taapaa Hiti Tole Improvement Committee
23. Tangal Tole Improvement Committee
24. Thapaa Hiti Tole Improvement Committee

3. Rally on Historical Stone Spouts and Source Conservation: 27 May 2006

A rally organized in association with Lalitpur Municipality and NGO Forum in Patan on the occasion of Sithinakha to raise the issue of *hiti* conservation in Lalitpur.

4. Workshop on Historical Stone Spouts and Source Conservation 2006: 7 April 2007

Lalitpur Municipality Stone Spouts Conservation Workshop was held in Chyasal, Lalitpur. This workshop to identify the issues and challenges was attended by organisations representing hities of Lalitpur as well as participants from Bhaktapur and Kirtipur.

5. Pre-convention Workshops on Hiti and Source Conservation

7 April 2007	Lalitpur Pre-convention workshop
26 May 2007	Kirtipur Pre-convention workshop
9 June 2007	Bhaktapur Pre-convention workshop
15 June 2007	Madhyapur Thimi Pre-convention workshop

6. Rally on Historical Stone Spouts and Source Conservation 2007: 16 June 2007

A rally organized in association with Lalitpur Municipality, NGO Forum and Rotract Clubs of Lalitpur in Patan on the occasion of Sithinakha. Twenty-five organisations 31 various committees and 77 women groups representing various walks of life from Patan participated in this rally. More than 10,000 people participated in the rally demonstrating their solidarity in conserving stone spouts and traditional water sources.

7. National Convention on Stone Spouts: 18th June 2007

A national Workshop on Drinking water and Conservation of Stone Spouts and their Sources was organized in association with NGO Forum at Hotel Himalaya. This workshop cum convention was participated by representatives of five cities of Kathmandu Valley. Inaugurated by Minister of Physical Planning and Works Ms. Hisila Yami, the workshop was chaired by Mr. Satya Mohan Joshi, Senior Scholar of Newari Culture. Mr. Prayag Raj Joshi and Mr. Padma Sunder Joshi presented papers on technical and managerial parts of hiti conservation. Representatives of Archaeology Department, Department of Urban Development and Building Construction, CEO of Lalitpur Sub-metropolitan City, political party representatives, Kathmandu Valley Town Development Committee, Nepal Water Supply Corporation, university professors, etc. participated in the workshop.

The workshop was the plenary of five workshops organised by five cities and was synthesised to produce a common declaration on hiti and source conservation.

In addition, as the token of conservation, the convention declared to take the case of Saptapatal Pukhu and Sundhara Hiti Conservation as the national issue to be addressed with priority.



DECLARATION OF NATIONAL CONVENTION ON STONE SPOUTS

Conservation of Stone Spouts and Source Conservation for Drinking Water Declaration 2007

1. The ownership of traditional water sources including stone spouts be given to local authorities.
2. The policy lacking in the field of stone spouts and source conservation will be addressed by the Government of Nepal.
3. Local authorities will take the responsibilities of preparing maps of stone spout system from source to sink along with cadastral mapping.
4. Historical stone spouts will be declared as national heritage
5. Conserve water sources and water path passing through private land. For the conservation of watersheds and aquifers the government will declare the area as watershed area.
6. Annual budget for stone spout and source conservation will be allocated.
7. The municipalities will organise local communities including women into formal users' groups and strengthen them for the conservation of stone spouts and sources.
8. Promote and celebrate Sithinakha festival as national festival of sanitation and organise programmes of traditional water sources conservation on that day.
9. Promote studies on stone spouts, conduct researches and incorporate the subject in various levels of curricula.
10. Promulgation of acts to control unauthorised use of ground water that hampers the stone spout system.
11. Bring concrete programmes on stone spouts and source conservation by national and international non-governmental organisations.
12. Adopt concrete policies, programmes and resources for the conservation of stone spouts and source by local and central government.

Signatories

Ministry of Physical Planning and Works, GoN, Minister,
(Ms. Hisila Yami)

(Mr. Dilip Maharjan)
Member of Parliament

(Bhaktapur Municipality)

(Bhaktapur Municipality)

Chairperson, HSSCA
(Mr. Sushil Shrestha)

(Ms. Lajana Manandhar)
Chairperson, NGOFUWS

STATUS OF PUKHUS IN PATAN



SN	NAME OF PUKHU	STATUS	USE	REMARKS
1	La Pukhu	Existing		
2	Paleswan Pukhu	Existing, size reduced	Office	The Municipality office
3	Pode Pukhu	Lost	Office	Trade Promotion Centre Office
4	Pukhu behind M School	Lost	School	Madan Memorial School
5	Chhabaha Pukhu	Lost	Public facility	Community Dev. Div. of LSMC
6	Nag Pukhu	Lost	School	Shree Shanti Vidyashram P S
7	Ligan Pukhu	Lost	Public facility	Public toilet at Patan Dhoka
8	Pimbaha Pukhu	Existing		Conserved
9	Purnachandi Pukhu	Existing, size reduced	Public facility	Public garden
10	Kumbheswor Pukhu	Existing		
11	Bhandarkhal Pukhu	Existing		
12	Kuti Saugaa Pukhu	Existing		
13	Khapichhen Pukhu	Existing		Maintenance initiated
14	Cyasaal Pukhu (A)	Lost	School	Shramik Shanti School
15	Cyasaal Pukhu (B)	Existing		
16	Capah Pukhu	Existing		
17	Bhinchhebaha Pukhu	Lost	Private	
18	Guita Pukhu	Existing		
19	Balkumari Pukhu (west)	Existing, size reduced	Public facility	Converted to garden
20	Balkumari Pukhu (north)	Lost	Public facility	Solid Waste Transfer station
21	Balkumari Pukhu (east)	Lost	Private	
22	Tyagal Pukhu	Existing		
23	Podekasi Pukhu	Lost	Public facility	Public open space
24	Chau Pukhu	Lost	School	Prabhat School
25	Lakhe Pukhu	Lost	School	Shramajeet Kishore School
26	Kanibahal Pukhu (Bhailagaa Pukhu)	Existing, size reduced, surface sealed	Public facility	
27	Luksi Pukhu	Existing, size reduced, surface sealed	Public facility	
28	Prayag (Pya) Pukhu	Existing, size reduced, surface sealed	School	
29	Lagan Pukhu	Lost	Office	
30	Saptapatal Pukhu	Existing, size reduced	School	Namuna Machindra Boarding School
31	Lagankhel Pukhu 1	Existing		
32	Lagankhel Pukhu 2	Existing		
33	Lagankhel Pukhu 3	Existing		
34	Nhu Pukhu	Existing	Market	Sides encroached for market
35	Ta Pukhu	Existing, size reduced	Private	
36	Itungaha Pukhu	Existing		
37	Pukhu next to Chabaha	Lost	School	Baal Mandir
38	Jywalakhel Pukhu	Existing		
39	Eulakhyo Pukhu	Existing		No water

Source: Joshi, P R (1993) and updated by the author





LIST OF PERSONS CONTRIBUTED IN THE STUDY

1. **Mangah Hiti, Mangal Bazar**
 - a. Gopal Shrestha
 - b. Bhai Raja Shrestha
2. **Chyasa Hiti, Chyasa**
 - a. Raju Byanjankar
 - b. Kaji Babu Byanjankar
 - c. Mohan Byanjankar
 - d. Bhim Maya Byanjankar
 - e. Hari Krishna Byanjankar
 - f. Narayan Byanjankar
3. **Taapaa Hiti, Tapahiti**
 - a. Dev Krishna Khadgi
4. **Alkwo Hiti, Ikhachhen**
 - a. Bhaju Ratna Shakya
 - b. Gyan Bahadur Napit
 - c. Madan Krishna Juwaa
 - d. Kil Bahadur Shrestha
5. **Thapaa Hiti, Thapahiti**
 - a. Naresh Bir Shakya
 - b. Purna Man Shakya
 - c. Amir Shakya
 - d. Rajan Shakya
6. **Lagankhel Batawaran Sudhir Shrestha, Lagankhel**
 - a. Purna Sthapit
7. **Nugah Hiti, Sundhara**
 - a. Manoj Chipalu
 - b. Hari Sharan Chakhun
 - c. Rajiv Shrestha
 - d. Prem Bahadur Shakya
 - e. Rajesh karmacharya
 - f. Kul Bahadur Chitrakar
 - g. Bhim Hari Joshi
 - h. Saroj Tandukar
8. **Mr. Padma Sunder Joshi, Associate Professor, IOE, TU**
9. **Mr. Satya Mohan Joshi, Pragma, Bakhum Bahal**
10. **Dr. Sundarsan Raj Tiwari, Professor, IOE, TU**
11. **Mr. Pryag Raj Joshi, Program Officer, UDLE/GTZ**
12. **Mr. Narayan Govinda Halwai, MEH Consultant**
13. **Mr. Dilip Joshi, Secretary, HSSCA, subahal**
14. **Mr. Chandra Lal Nakarmi, Branch Manager, NWSC**
16. **Mr. Prakash Amatya, ED, NGO forum for Urban Water and Sanitation**
17. **Ms. Saubhagya Amatya, Lalitpur Sub-Metropolitan City**
18. **Mr. Prabin shrestha, Lalitpur Sub-Metropolitan City**
19. **Dr. Roshan Raj Shrestha, CTA, UN-HABITAT**
20. **Mr. Rajesh Manandhar, UN-HABITAT**
21. **Ms. Sudha Shrestha, UN-HABITAT**

