Experience sharing on Nature based Solutions implementation for urban water management in municipalities of Nepal

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Outline

- Context
- NBS implementation- Two cases study cities
- Lesson learned

Threats to local water security

Urban centers of the Himalayan region vulnerable to water crisis because of

- ✓ rapid population growth
- ✓ climate change
- ✓ geographical condition
- ✓ less adaptive capacity
- ✓ weak water governance

Threats to local water security

Urbanization

- Nepal is one of the ten least urbanised countries in the world.

However, it is also one of the top ten fastest urbanising countries. (UNDESA, 2014)

- Urban population growth rate in Nepal almost **doubled** from 3.6% in 1991 to 6.5% in 2001, and the number of urban centres increased from **58** in 2013 to **293** in 2017
- Rapid, unplanned urbanization **dominated by grey engineering**
- High urban population growth rates (demand>>supply)
- Socio-economic development trends; lifestyle change

Climate change

- Nepal is ranked as 4th vulnerable country of climate risk (Global Climate Change Risk Index 2019)
- Extreme weather events - Floods and droughts
- Glacier melt & GLOFs
- Drying springs and ground water– mid hills; where about 45% of the total population of Nepal lives in hills

Trend of anti-nature urbanization affecting water sector

- Green spaces are being covered rapidly including centuries old age ponds
- Trees are being cut down for road expansion
- Emerging urban centers are growing as touristic destination, hence more concrete
- New municipalities are constructing road haphazardly – hazards and natural springs channels cut off

Conservationists are not so keen about Kamal Pokhari restoration project

Kathmandu Metropolitan City is restoring the centuries-old pond as a recreation centre complete with small artificial ponds at four corners and a fountain at the centre.

Haphazard construction of rural roads causing landslides

The construction of roads without proper surveys has been the leading cause of landslide several places of the hill districts.

Ring Road Improvement Project to axe over 2,000 trees from Kalanki to Maharajgunj

Officials say the move is part of a drive to widen the road from three lanes to eight lanes.

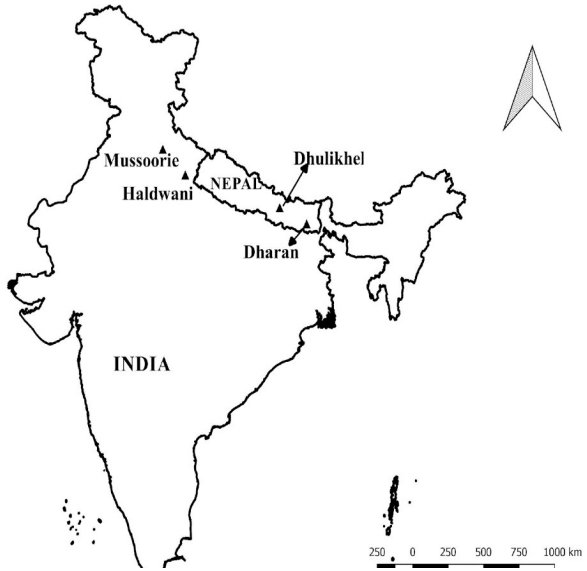
Factors affecting Municipal Water

- Multiple factors
- Multiple actors
- Multiple views
- Multiple priorities

Tough game to play

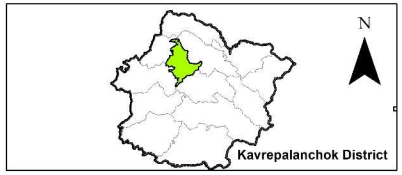
Climate Adaptive Water Management Plans For Cities In South Asia

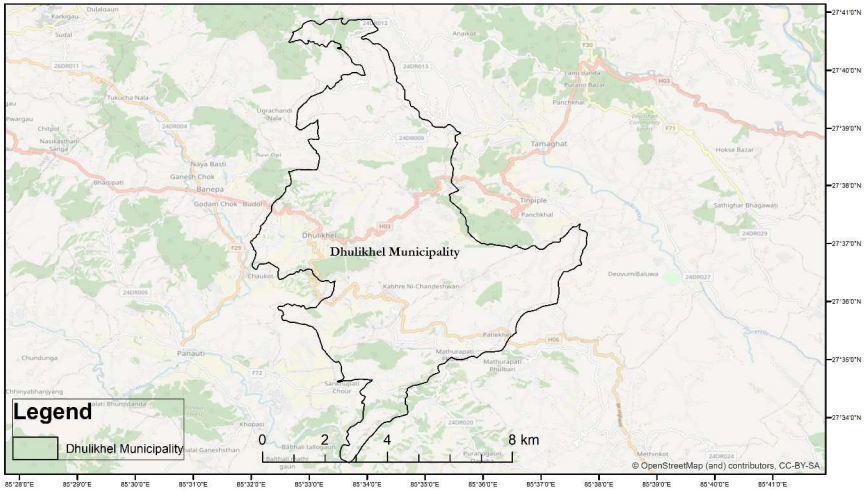
- An action research project implemented in four rapidly growing cities (IDRC Canada funded) 2016-2020



- Nepal sites:

Dhulikhel Municipality and
Dharan Sub-metropolitan city





Implementation of NBS Dhulikhel Municipality case

Improving urban water supplies

Picture credit : Dhulikhel Hospital

General scenario of study sites

Dhulikhel

- **Geography:** Mid hills

Water supply: Community managed drinking water supply system operational since 1991 from Roshi Watershed

Status of drinking water

- ❑ Peripheral region depended on local spring; unreliable, intermittent
- ❑ 10 hours supply of quality water at core
- ❑ Water demand >>supply

Recent Initiative of Dhulikhel municipality

- Continued negotiations with upstream community
- larger-scale water supply project
- a program of 'one house one tap' to ensure water security in rural areas which were included in the municipality

History of Social Conflicts for Water

"Shutting down the water supply was our only option"

"For 15 years we have been deprived of drinking water"

"But the committee never supplied the promised water"

"We pay tax to the municipality but we do not get water"

- Upstream downstream
- Core and periphery within the city
- Competing water needs: Commercial vs local use

Identifying the problem

- Multistakeholder approach
- Entry point: City scale workshop

  (i) to identify the most prioritized water management issues

  (ii) identify solutions to mitigate the problem.
- Innovative city level platform for informed deliberation was proposed
- Hence, **Water Forum,** locally named as ***'Dhulikhel Paani Chautari'***
- provided the systematic way of **engaging diverse stakeholders** in discussing local level water-related issues, identifies approaches to address issues
- The forum allowed a conducive environment for **input of knowledge** from various sources
- Moderated dialogue focussing on innovative solution to the identified problem

Water Forum

- Formalised *"Paani Chautari" - A discussion forum*
- City level representatives of water related institutions engaged

Why?

- to promote learning culture among diverse stakeholders of city water supply system to co-create knowledge
- To ideate water management plans and strategies on the basis of knowledge created
- Explore opportunities for collaborations among local stakeholder institutions

Structure?

- an informal and open deliberative platform
- No rigid structure – all relevant stakeholders can be a part
- Facilitator, experts and relevant stakeholders

Prioritization of strategies by stakeholders in the water forum

Mitigation Strategy	Study Cities	
	Dharan	Dhulikhel
Rain water harvesting for drying spring	+	+++
Ground water recharge	+++	-
Source area protection	+++	+++
Watershed conservation	++	+++
Leakage control	-	+
Water utilities reform	+	+
Staff capacity enhancement	++	++
Water tariffs/pricing	++	++
Non-revenue water reduction	-	-
Public-private partnerships	+	+

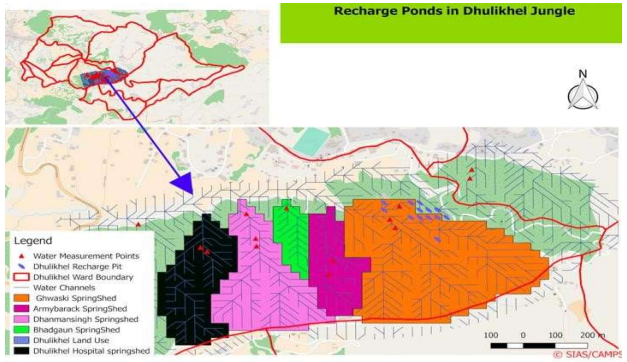
Groundwater extraction is increasing: ADB funded new project; in dry season 66% of total water supply is covered

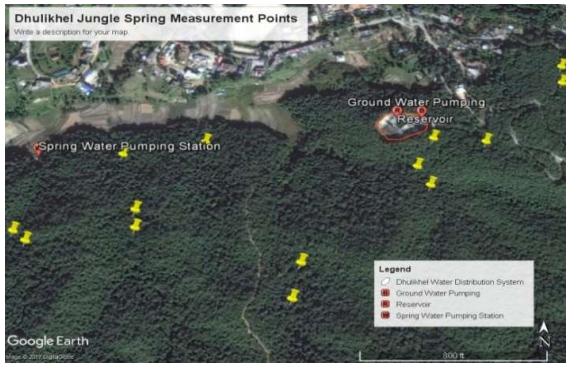
"As we are being more dependent on ground water, we must need to think of how ground water can be conserved. The major challenge is increasing land sealing in urban areas"

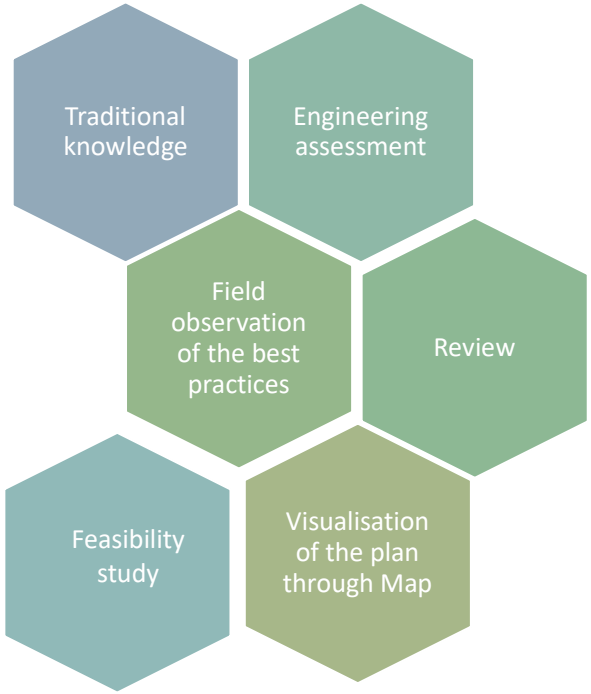
(Chief Planning Chief of Dharan Sub Metropolitan, Dharan Water Forum II, 31st March 2017)

Identification of appropriate solution

- prioritised, **"constructing recharge ponds"** as the most appropriate intervention to revive drying spring
- gathered knowledge from diverse sources- makes the idea more **socially acceptable and defensible** to a range of stakeholder
- Three types of recharge ponds - excavated ponds, embankment ponds and contour trenches were recommended to suit the topographical feature.
- Two locations- 1600 m and the 1550 m were suggested with about 50 cm deep along the contour.





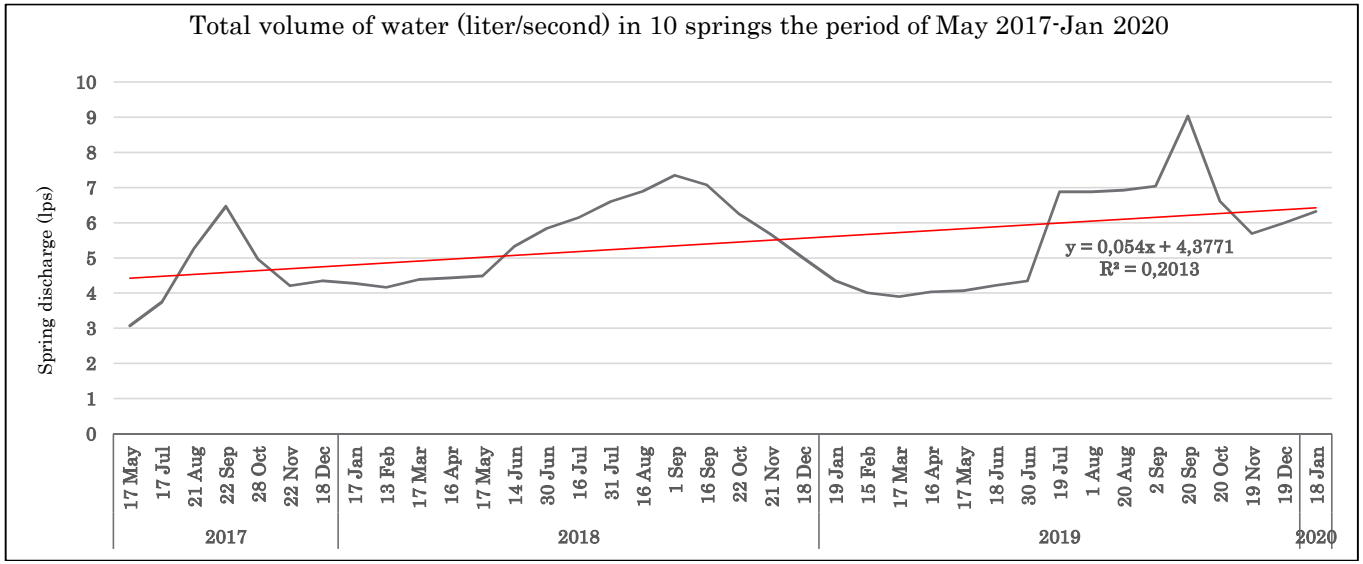


Piloting NbS

- Purpose to showcase tangible action among city stakeholders
- gave an opportunity to assess what works and what not on the local context and allowed innovation.
- Network of "recharge ponds and countour trenches" were found appropriate
- Altogether 64 small scale ponds ranging from 3.45 m^3 to 35.69m^3 were constructed covering wider area as a recharge zone.
- shapes of ponds were varied according to the location
- contributed in strengthening confidence level of stakeholders by generating evidence on efficacy, the idea of the cost incurred in its implementation and the absence of negative impact

Piloting NbS

- **Efficacy measurement:** A continuous **monitoring mechanism** - measure the discharge of springs using a simple bucket method to test the correlation between recharge ponds and springs.
- monitored once in a month (twice a month during monsoon) from May 2017 till Jan 2020.
- Spring hydrograph: a linear **increasing trend** line of average monthly discharge for the given period indicating a gradual but statistically low increment of water flow from these sources.
- **gradual increase** of the yearly peak discharge from 6.4 lps ,7.3 lps to 9.0 lps on 2017, 2018 and 2019 respectively
- created a **strong base** for stakeholders to realize the importance of recharge ponds



Institutional collaboration

- needed for – setting governance mechanism, generate fund for NbS implementation and other institutional support
- **Direct collaboration:** Dhulikhel Municipality and Dhulikhel Drinking Water Supply and Sanitation Users Committee (DDWSUC) , the lead public authorities for managing drinking water
- **Consultation:** Division Forest Office, District Soil Conservation Office, Gokhureshwor Community Forest Users Committee
- important role of community forest users community as a provider of the public land
- **Subsidiary local institutions** –
- University - knowledge generation
- private sector (hotels and resorts) - finance
- Nepal army - physical labor contribution

Financing and mainstreaming

Finance

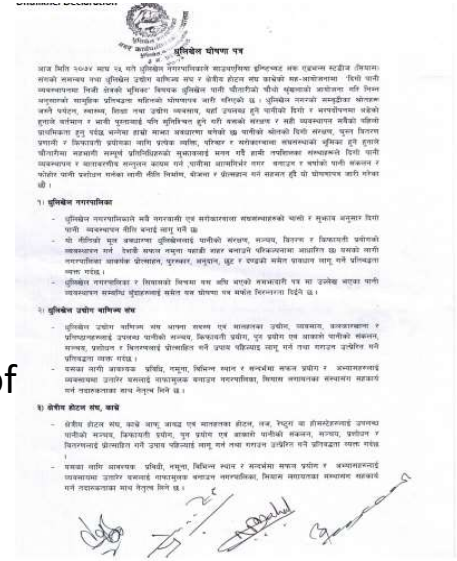
- seed fund by the project
- Dhulikhel municipality allocated funds for the second phase ponds construction

Mainstreaming in municipal policy for scaling up

- In the municipal policy and programs of the fiscal year 2018/2019, the municipality **recognized the benefits of recharge pond**
- has adopted the **policy of revitalizing existing ponds and building new ponds** in each wards “
- **"one ward one pond program”** with NPR 2 million budget allocated
- NRs. 1.16 million budget was allocated for the water resources (springs wells, ponds and stone spouts) conservation and management activities for the fiscal year 2074/75.
- Municipality is planning to adopt a public private partnership approach to promote recharge ponds integrating tourism and other livelihood activities too.
- Municipal planning and budget document of the fiscal year 2020/2021 has ensured the sustainable use of the water resources **continue** multistakeholder engagement through **water forums**, build recharge ponds and implement other conservation measures (Dhulikhel Municipality, 2020).

Summary

-adopted incentivizing policies of abate tax for private sector
- Draft city scale sustainable water management policy
-Hotel Association of Dhulikhel, Chamber of Commerce and Industries
- promote water efficient technologies water reduce, reuse and recycle for its members



Water form I
- discussion on issues and prioritization
- need of water secure plan common understanding of the stakeholders.

Water forum II
- Discussion on the most critical water issue
- Best possible adaptive actions to address the issue
- Local spring - Water volume are declining
- Recharge ponds – solution

Water Forum III
How artificial recharge ponds can increase the rate of natural infiltration to augment ground water aquifer

Water Forum IV
Recharge ponds Pilot
Decision

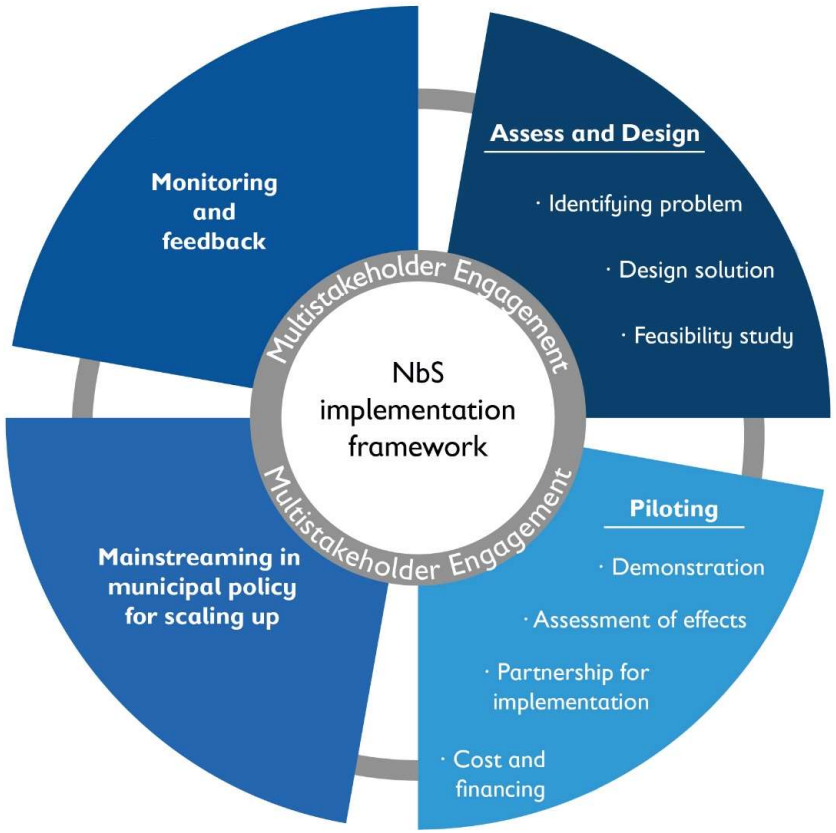
Making room for the groundwater recharge: Dharan case

Source: Kaustuv/SIAS

What Dharan Municipality did?

- Problem: Groundwater extraction and storm water management
- Identified (hybrid) NbS: increase the water retention by combining HH level RWH and GW recharge
- Endorsed the mandatory policy of recharge pits at household level
- Collaboration with Central Union of Painters, Plumbers, Electro and Construction Workers
- Local masonry entrepreneurs trained on constructing recharge pits
- Policy created business opportunity for local entrepreneurs

Proposed implementation framework



follows a cyclical and consultative process where both the local stakeholders and experts continuously learn for co-production of knowledge and co-design of the context-specific nature based solutions.

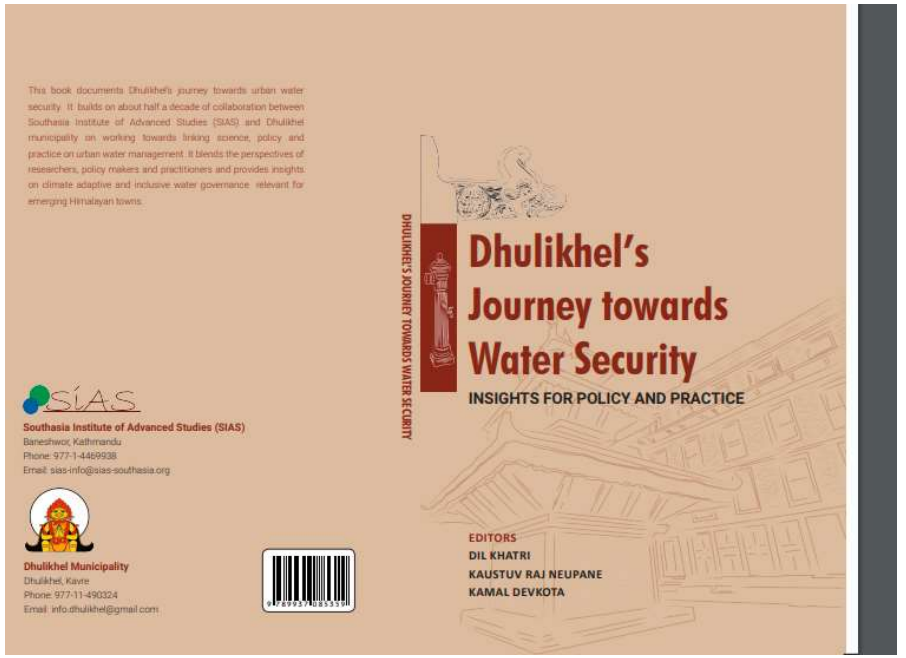
Lessons

- Nature-based solutions are very site-specific
- Building on what is already known and what are the major issues
- Long engagements with major stakeholders is needed
- Proper input of knowledge both scientific and local and integration of the interdisciplinary (ecological and social) studies of urban systems
- finding synergies and complementarities across institutions represented in the network
- (a) engagement, (b) evidence and, (c) ownership for the success of any nature based solution at ground level.
- Definition of “Development” perspective needs to be changed at local level
- Policy has the power to transform the project based intervention to the landscape level

  (though implementation and funding is the key)
- Municipality local government are very keen to collaborate if they feel – they are also in the need of evidence based policies.

Publications

- Toolkit
- Book with NBS chapter



Thank you for listening!

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